



Permaculture applied in the recovery  
process of people with mental illness

# TRAINING GUIDE



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## PROLOGUE

PERMIND is not just another organic farming course; it is a **change of mentality**. Permaculture is a way of life, a set of values that are applied in everyday life and in all facets of life (such as taking care of the Earth and its people, equitable resources distribution, responsible consumption, observation and learning). It means we become a constructive part of our ecosystem; we can change it, but respecting its millenary balance and never forgetting about its necessities. It means working in a responsible way where we care about the future not thinking about an instant solution, but a solution that will last in time. It is a process that requires time, just as every change we make, so we need to learn how to BELIEVE that what we're making really works. We need to forget about our conventional way of working the land and trusting that permacultural techniques will really allow us to bear fruit.

As long as the steps explained in the PERMIND Training Guide are followed, you will see that these techniques work. They allow you to save water, to prevent adventitious plants to spread, to understand that wildlife is nothing but helpful to the productivity and that, eventually, your work in the edible garden becomes less stressful and more rewarding. It is more than necessary to BELIEVE in what we are about to do and let go off conventional farming techniques. One might make mistakes, undoubtedly, as it always happens when we learn something new. We might feel frustrated at times and feel the urge to go back to old techniques in order to feel safer, but we guarantee that Permaculture is worth it. **We encourage you from the heart to let yourself fall in love with Permaculture, for the innovation of the natural.**

Laura Martínez Domínguez (Fundación INTRAS)

## ACRONYMS TABLE

**ADP:** Association for the Development of Permaculture.

**CEE:** Special Employment Center *Finca El Mato Permacultura*.

**CEIP:** Nursery and Primary School.

**CIRPAC:** Insular Council of Psychosocial Rehabilitation and Community Action.

**CIULL:** Interdisciplinary Course of University of La Laguna.

**CTULL:** Transdisciplinary Course of University of La Laguna.

**FEMT:** *El Mato Tinto* farm.

**IASS:** Insular Institute of Social and Socio-Health Care of Tenerife.

**PIRP:** Insular Plan of Psychosocial Rehabilitation

**ULL:** University of La Laguna.

## INTRODUCTION



Behind the PERMIND Training Guide there are two stories: the story of an anecdote that turned into a symptom and the story of a life project that leads to the Association for the Development of Permaculture (ADP), entity responsible for the development of this Permaculture guide.

Let's start with the anecdote. The 10<sup>th</sup> of November 2016 the ADP received an express e-mail with the subject "Proposal of collaboration with Foundation INTRAS". The e-mail was signed by Laura Martínez Domínguez, from the Projects Department of the Foundation INTRAS, and it said:

*Good morning:*

*I am Laura Martínez, projects manager of Foundation INTRAS. I left a message on your voicemail but I thought it would be interesting if you had the information in writing as well so you knew the reason for my call.*

*We are a non-profit body with the aim to improve the life quality of people suffering from severe and long-term mental illness. We have been working since 1994 and we have centers in several provinces of Castile and Leon (Toro, Zamora, Valladolid, Peñafiel, Benavente and a supervised flats network and community social support teams in other provinces of the region). We count on a projects department, which I am part of, which mission it is to search funding for our activities (we are a private foundation) and facilitate overall new activities for our users (targeting their recovery and full integration). We search this funding mostly in Europe through our involvement in many European projects. That is exactly why we contact you.*

*We are preparing a project proposal for an Erasmus+ call based on permaculture in order to write a training guide in order to train persons with mental health issues in this field. We have seen that your Association for the Development of Permaculture applies permaculture as therapy and we are interested in your experience and we want to*

*suggest a partnership in this European project along with us. We have recently been able to launch an ecological horticulture line made possible due to another European project too: the HORGANIC project. We would like to go even further and get to know the permaculture world and see if it could represent an added value for our work with persons with mental illnesses. We also work along with the agricultural engineering school INEA and its urban vegetable gardens project. I hope you find our proposal interesting and I look forward to your response.*

*With kind regards,*

*Laura Martínez Domínguez - Projects Department of Foundation INTRAS*

Five months later on March 27<sup>th</sup> 2017, the PERMIND project proposal was presented in the *Key Action 2 Framework – Strategic Partnership for Adult Education (KA2014)* of the Erasmus+ program, with the type Innovation Development. A project composed of five partners: the mentioned Foundation INTRAS as main partner, the Slovenian SENT (Slovenian Association for Mental Health), the Greek Society of Social Psychiatry & Mental Health, the Swedish Changemaker and the Association for the Development of Permaculture.

Four months later on July 25<sup>th</sup>, the project was approved. The kick-off meeting took place on the 25<sup>th</sup> and 26<sup>th</sup> of October the same year in the ADP headquarter, Finca El Mato Tinto, Tacoronte, Tenerife. A day prior to the meeting, we asked Laura Martínez something that had been left out: How did INTRAS find out about ADP? Laura, agricultural engineer graduate, told us she heard about Permaculture at some point during her university training. After having worked on her ecological horticulture project as a therapeutic tool for INTRAS, she wanted to learn more about the mental health recovery potential of Permaculture. When she was searching information, she googled “mental health permaculture” and immediately found results about the ADP. From that point on, she got into contact with the association.

That’s the anecdote story. An anecdote that ends up becoming a symptom, a signal of something already happening: the act of Permaculture being applied to mental health recovery, a process we will share in this training guide starting from the ADP experience.

We move on to the second story: a story of a life project that leaded to the foundation of the ADP. A story that intends to serve as a visiting card of the ADP training experience and as a transfer of knowledge represented by the PERMIND Training Guide. The story is presented with some hints of this training activity.

Since 2002 the ADP has remained active in a big training activity in the Finca El Mato Tinto working in different fields: the first experience was all about mental health therapy and pre-labour and labour integration training of the Special Employment

Center Finca El Mato Permacultura (CEE-FEMP). This will be addressed in the Didactic Unit I of this guide for its relevance for persons with mental health illness.

Since then until now –August 2019– many training activities have been carried out in elementary school, high school, professional and university training, extended training activities of public administration, and farmer-to-farmer and farmer-expert projects where Permaculture is shown as an observation activity of the natural ecosystems dynamics. This observation helps to design production systems that meet human needs without any environmental degradation.

When it comes to systematize and develop the PERMIND Training Guide, we have relied on four training activities developed in the Finca El Mato Tinto during the last 17 years.

- The mentioned Special Employment Center Finca El Mato Permacultura (2002-2013), a social company focused in pre-labour and labour integration through Permaculture-based mental health therapy (Figure Int.1).



Figure Int.1 - Informative CEE-FEMP and ADP poster

-The “That’s how we do it in the garden” project (2011 until now, 2019). A project made along with the Tacoronte City Hall Education Council, where the ADP and its headquarter, the Finca El Mato Tinto (FEMT), are located, and in which the University of La Laguna has collaborated as well. The academic management of the project has been carried out by Juan Castro de Paz, ADP collaborator and university lecturer. The project intends to enhance the school vegetable gardens of every Educational Center of the council through 3 main activities: 1) A training course in the farm for the teachers responsible of the school vegetable garden; 2) A students group visit with the teachers from each educational center to the FEMT, where they follow scheduled activities related to Permaculture (visit to the farm, seeding and planting activities, invertebrates and microorganisms observation with a bifocal lens, the natural

purification system of wastewater, interaction with farm animals, etc.) (Figure Int.2); and 3) A monitoring and advice *in situ* of the ADP staff in the school vegetable gardens.

The monitoring and advice purpose is to check the development level of the Permaculture techniques applied in the school vegetable gardens, to advise about their implementation, to solve the doubts of the teachers responsible of the school vegetable gardens, and to meet the demands needed for the project improvement. The 2018-2019 academic course is its 8<sup>th</sup> edition.



Figure Int.2 - Images of various activities of the “That’s how we do it in the garden” project

This experience of permacultural knowledge transfer and replicability has been very useful for ADP as a partner in order to meet the PERMIND objectives. It is also an opportunity to spread the PERMIND project since the students and teachers are informed about it during the visits to the farm (Figure Int.3). It is a strategic social group that can make PERMIND visible in their families.



Figure Int.3 - Images of pupils and teachers from the CEIP San Juan Perales (left) and Ernesto Castro Fariña (right) with ADP collaborators after explaining the PERMIND objectives in the “That’s how we do it in the garden” project activities framework (March 2018)

- Five interdisciplinary and transdisciplinary courses of the University of La Laguna (2012-2016), competitive university courses that used the FEMT as a learning classroom. The management of these courses has been carried out by Juan Sánchez García, ADP collaborator and university lecturer. The public targeted by the courses can be anyone, academic or not, who is interested in the subject (Figure Int.4).



Figure Int.4 - Images of a poster and various activities of interdisciplinary and transdisciplinary courses of the University of La Laguna in the FEMT

As an indication, the titles of the 5 courses:

- *First observe and then reflect in the wake of perception: creation of proximity in the university-society relationship (CIULL2012).*
- *The setting of limits: a new cultural awareness (CIULL2013).*
- *Transition initiatives and research oriented to and with the community (CIULL2014).*
- *Cultivating soil, food and health (CIULL2015)*
- *Permaculture as an opportunity for transdisciplinary dialogue (CTULL2016).*

These training activities had a high acceptance rate as the positive anonymous students survey shows about each course. These courses were composed of a great variety of students from various professional and social frameworks and ages.

An indicator of this training activity acceptance, and therefore as a training potential of the ADP and its FEMT, is shown by the answers given by the students on the last course edition to the question *How would you evaluate the role of the Finca El Mato Tinto as the courses implementation place?*

- *Important and essential supporter of a true training with authentic trainers.*
- *It is a key place for inspiration, such a luxury that we have here in the island.*  
*An ideal campus for transdisciplinarity.*

- *It is the perfect space to learn. Everyone has to visit it and do some course here, no matter what you are dedicated to. "Everything is linked and integrated"*
- LASOS project (2014-2016 stage). "CEE Finca El Mato Permacultura" project is declared good practice by the United Nations Human Settlements Programme (UN - HABITAT) in the 2012 edition (Figure Int.5). It is a program that promotes villages and cities to become socially and environmentally sustainable.



Figure Int.5 - Images of the CEE-FEMP designation as a good practice by HABITAT

As a result of such qualification, island public administrations identified the ADP and its farm as a referral laboratory and center of the LASOS project (Agroecological Laboratory for Sustainability). This is an innovative project that was developed during a workshop in the Finca El Mato Tinto by farmers, researchers and technicians from various areas of the Tenerife Island Town Halls and other public and private entities with the aim to promote, to enhance and to develop agroecology and collaboration networks (Figure Int. 6).



Figure Int.6 - Images of the LASOS project logo and the "ground connection" and co-creation of the project

The Finca El Mato Tinto, headquarter of the ADP, was taken as the referral experience, as the pilot case and inspiration source for the development of the project due to its aims of designing and recovering sustainable agroecological and social activities. An ADP declared of public interest.

The project has been a place where experiences and information are exchanged through the knowhow and the resources of the ADP: training *in situ* activities, agricultural advisory services, research, dissemination... in order to learn in a shared and cross-sectional way about real cases and to set the action guidelines with the largest range.

The visualization workshops arisen from the “ground connection” with Permaculture were described as the core element in the addressed activities structure of the project (Figure Int. 7).



Figure Int. 7 - Images of one of the LASOS project visualization workshops

These workshops were held through what we call the “ground connection” methodology, which we will talk about in the chapter “Methodology of the PERMIND Training Guide”.

## PERMIND TRAINING GUIDE METHODOLOGY

To address the development and implementation of the PERMIND Training Guide, there have been two key ideas: the “ground connection” method and the “co-creation” approach.

The “ground connection” method forms in many ways a test in many ADP training activities that take place in the farm that ease communication, connection, motivation and involvement in an inspiring environment such as the FEMT. It aims to promote collaboration between persons and entities through the identification of mutual objectives and synergies.

Every person taking part in these training activities and workshops with this method start by **feeling the place** during a visit to the farm carried out by those responsible of the ADP.

This technique was implemented since the very first training activity in the farm with the construction of the Special Employment Centre since the main therapeutic and training method have been applied since the very beginning of the setting up of the farm itself (Figures Met.1 & Met.2).



Figure Met.1.- Images of the building process of the bioclimatic classroom in the FEMT



Figure Met.2.- Images of the classroom development

The CEE-FEMT implementation *modus operandi* is the “ground connection”: a permanent contact with the soil, animal and plant biodiversity and permacultural design. The use of soil as an educational and therapeutic tool allows developing

responsibility, empathy, job training, perseverance, respect, tolerance, teamwork, the work well done, knowledge and respect for the environment... But overall it keeps students focused in the “here and now” as an important step in the development of their mental health.

It has been a co-creation method between the CEE-FEMP workers and ADP collaborators, students and volunteers that has put its own stamp on every training activity, just like it has put its stamp on the PERMIND project proposal in the very beginning and during this training guide preparation, as we will reveal below.

The **“ground connection” methodology** as a strategy to launch the PERMIND project was suggested and implemented between November 2016 and March 2017 during the co-creation stage. During the proposal development, the ADP asked the project coordinator about prior Permaculture knowledge of both the persons responsible of the partner institutions and their instructors that work with persons suffering from mental illness. She answered that there was little knowledge about Permaculture in those groups and if the project is approved, project coordinators and trainers would be different persons. The trainers would implement the one-year pilot PERMIND projects, with the aim to experience the 4 different seasons after assisting to an intensive ADP course of Training for Trainers in the Finca El Mato Tinto.

Starting from this very moment, the PERMIND **co-creation approach** is implemented. Nevertheless, this approach has already been taken into consideration in the PERMIND proposal when talking about the pilot projects to be developed by trainers and students with mental health problems.

The ADP suggested and argued the need of a kick-off project meeting in the FEMT in order to make every PERMIND partner feel and share Permaculture and its therapeutic potential.

This meant starting the project with the permacultural approach to “observe first and reflect about what is perceived afterwards”. It is a very profitable exercise consisting in getting to know and feel *in situ* that creates a link between Permaculture and mental health. Plants, animals, landscapes, buildings, technologies and human settlements integrate in harmony and symbiosis to establish a rich diversity. This shows how this integration manages to create a stability and endurance of the natural ecosystems and therefore its higher potential to achieve economic long-term sustainability.

The kick-off “ground connection” was seen as a momentous test for the beginning and the development of the project. It was presented and argued as a challenge that must be addressed in the project proposal.

If the initial “ground connection” in the farm was successful in a first meeting, it would probably encourage partners to share the Permaculture experience and its therapeutic

potential with their department heads and the future trainers that assist to the intensive course of Training for Trainers (Figure Met.3).



Figure Met.3.- Images of the “ground connection” during the kick-off PERMIND meeting in the FEMT (25-26 October, 2017)

In PERMIND we talk about pilot projects, monitoring visits to the pilot projects by the ADP, e-learning platforms, apps, but most of all the evaluation of the students of the various pilot projects and of the focus groups (constituted by the relatives of the student, technicians, neighbours, politicians, schools...) to achieve a critical analysis of the projects. All this **co-assessment co-creation process** has undoubtedly enriched the final PERMIND Training Guide project taking into consideration that at the end of the project the didactic units of the Training Guide are part of the free access e-learning platform.

The first meeting took place in the farmland, according to the first impressions about the “ground connection” methodology, it’s clear that the main objectives were achieved:

#### First assessment:

- *Very “warm” and nice atmosphere. Also healthy.*
- *The concept of “equilibrium” was the most important learning during the study visit in the PERMACULTURE gardens.*
- *The development of a culture (permaculture) that combines and utilizes all sources of energy to create a healthy ecosystem.*
- *At the moment for me permaculture it’s about building circled relationship between the soil, plants, water, animals and especially people.*
- *Great, really great hospitality. Very nice organized the whole farm. The works, the connection with the society, the atmosphere between your team.*

- *The "nature circle" animals -plants-earth is impressive.*
- *How important is to cultivate soil, sun and water.*
- *Our eco-system is composed by cycles but for several reasons we usually think about them as independent and not related. Living in urban contexts, it's really easy to forget this concept because fragmentation is the rule.*
- *The atmosphere is very nice. The idea of recycling the place shows how is everything part of our life, and can be used for the new beginning.*
- *The products are from the place. The mode of doing can be replaced in any situation.*
- *The initiative can be used if you ... feel the soil ... and if you can understand how the plants are growing.*
- *Totally different to what we know. Feeling of community and to be part of something, to be part of a natural cycle.*
- *Interesting, worthy to be known and also to disseminate it to general society*
- *The philosophy can be used in any situation of the everyday life: management, housing, marriage life, love, partnership, etc.*
- *Long-term work with relatively immediate results.*
- *Little investment that eases its sustainability.*
- *Attractive hook in a community atmosphere and associative movements.*
- *New professional profiles adapted to the special needs of persons suffering mental health problems.*
- *Philosophy transfer.*
- *How therapeutic can be for mentally ill people to cultivate and produce.*
- *A lot of possibilities of linking persons with mental health problems with this work philosophy.*
- *What heals the soil can heal the soul of people.*

Impressions in terms of questions:

- *The connection between Holistic slow approach versus "just do it attitude"?*
- *Digitisation and permaculture?*
- *The connection and the way it's connected to the high end cuisine restaurants?*
- *How many people can get food from this system?*
- *Are we always on time to recover a piece of land?*
- *Placemaking - the way the method and mindset of PM is connected to urban design. If you find a hole - plant!! [Referring to the act of the hole planting technique of a huge diversity of vegetables in a piece of land full of diversity that seems to be chaotic at first and which vegetable collection becomes an important weekly therapeutic exercise. We talked about this in the "ground connection" and we will keep on talking about it in the Didactic Units III and VI of this guide]*

Impressions in terms of doubts:

- *About its application in different climatic conditions with strong contrasts.*

We have to take into consideration that these impressions were written down at the very beginning of the PERMIND project, two hours after the kick-off meeting at the beginning of the 2-year project.

The summary of what happened during the first meeting reflects very well in the first paragraph of the first project dissemination newsletter: "When we started the PERMIND project in September 2017, none of the partners participating in it had met face-to-face. After the first meeting that we held in Tenerife (Spain) in October, we really felt that we are a family. This is the power of permaculture" (January 2018).

The Training for Trainers course became the first test to assess the guide quality given the opportunity to assess the differences between what trainers have read in the guide prior to the course and what is taught in the course. At the same time a co-creation exercise takes place during the course, which underlines the guide quality since the most frequent questions serve to create a Frequently Asked Questions section to be added to the e-learning platform.

The whole image of a "ground connection" with people from various cultural and climatic origins, with shared professional backgrounds and probably different therapeutic cultures, enriches the course itself and the guide and the pilot projects implementation. It certainly favours the creation of a PERMIND exchange network.

Another expression of the co-creation method happens during the PERMIND Training Guide development itself, in the linguistic field. Once written in Spanish by the ADP it was translated to English as the interface language for its later translation to other partner languages (Slovenian, Greek and Swedish).

The ADP requests every partner to not start translating the guide from English until the contrast between what is told in the guide and the information and training transferred during the intensive course has happened. They were asked to physically approximate to the course through the English version guide and to read it as if it were a touristic guide for a place worth visiting. In this case it is about a therapeutic place based on Permaculture.

During the intensive course week they met face-to-face with 22 years of permacultural experience of trial-and-error and 16 years of use of Permaculture as recovery tool for mental health, and which has been summarized and systematized in the PERMIND Training Guide they have read shortly prior to visiting the place. This turns out to be a priceless quality test to assess the guide and to visualize the replicability potential of the pilot projects.

It has also proved to be a co-creation opportunity to work with the trainers as a result of the critical remarks that result of the meeting. The feedbacks from the trainers was revealing to improve the guide quality and to ensure the project evolution. The learning curve derived from the feedbacks is a process that was taken into consideration during the whole implementation of the co-creation pilot project between the instructors and the students. The instructors were the transmitters of the Permaculture approach to mental health in their respective institutions – institutions with a long record in the health field.

An important part of the learning process is to reflect on what we learn. Thus, during the training course the trainers take their time at the beginning of the day to analyse the lessons of the previous day. Trainers tested that it was an enriching way to reflect step by step on the learning process and to promote knowledge exchange between participants. It's recommended to add this follow-up moment at the beginning of each step during the learning process.

The ADP monitoring visits have also been a reciprocity opportunity to get both parts together in the co-creation approach. It was useful for the ADP to identify the problems that the pilot projects were facing; to solve concerns and doubts shown in the kick-off meeting of the project in October 2017; to take into consideration different climates and cultures; and to enrich along with all of it the national and international coverage of the PERMIND Training Guide.

This joint PERMIND construction by means of evolutionary co-creation method has been very enriching for the development of a guide of this nature. The crowning moment was the assessment of the students themselves during the guide application in their respective pilot projects. The ADP, as responsible of the guide, also had the opportunity to share its impressions with those students during the monitoring visits – visits that were important to achieve the PERMIND objectives in the eyes of the project assessors.

This PERMIND Training Guide is not a proper guide about Permaculture, it is a guide focused on the **healing aspects** of Permaculture. That is why we begin with “Permaculture as therapy” in the Didactic Unit I and we follow with the remaining units with the design and maintenance of Permaculture and the therapy from a simultaneous approach: “Designing the place” (II); “Designing our edible garden” (III); “Edible garden forests” (IV); “Maintaining our edible garden” (V); “From the seed to the harvest” (VI) and “Bioconstruction as a form of therapy” (VII). We finish the guide with an Epilogue by means of a balance of Permaculture virtues, highlighting food, habitats and healthy human relationships.

**Have a good permacultural and therapeutic trip!**







Figure Met.4.- Collage of the PERMIND Course of Training for Trainers in *Finca El Mato Tinto* (19-23 March, 2018)

# FAQS



The following is a list of frequently asked questions based on the experience of visits and courses at the El Mato Tinto Farm, headquarters of the Association for the Development of Permaculture, and the supervision visits to the pilot projects of the PERMIND project.

The questions and their answers have been consciously placed before the teaching units of the PERMIND Training Guide as a touch of attention and reminder. We have extracted the answers from the didactic units that follow.

**Do I have to plow the ground to start from scratch?**

The soil could be ploughed one last time if it is too hard, even though it is not recommended since it would destabilize the soil life. If there is a lot of grass, it could be good to use a brush cutter or to cut them manually, spreading them out on the floor and soaking them. We can also use animals, such as hens, ducks, geese or pigs, building a corral in the garden -which we call edible garden-, a corral which can be fixed or movable, with shadow and water so we can leave our animals in enough time, which will be when the field is grass free and fertilised by the animals (see section III.1).

**Where do I get the compost to start creating the edible garden?**

If we dispose of our own mature compost it could be enough to start. If we needed large amounts we could obtain it from a nearby farmer by exchanging it for other products if both parties agree. This can either be organic vegetable compost, animal compost or even a mixture of both (see section III.1).

**If I have little compost, can I extend it more to have more soil for planting?**

No. At a minimum, the edible garden must have at the beginning a level layer of compost 15 to 20 cm high. This work is the most important investment that we must make to obtain good results permanently from the first year. We must never extend a layer thinner than 15-20 cm of compost, even if we want to have more farmland. It is

better to have less space with the minimum compost suggestion than trying to get more surface with less compost (see section III.1).

**Do I have to put newspapers back a second time?**

By observing the soil, we can see that the mulch and the newspaper or cardboard used at the beginning have decomposed and therefore we can start to notice the dark tone of the soil. When we start to notice small, bared areas in the mulch, this is the moment when the soil is hinting us that we need to cover it up again. This is the moment we need to restore the soil's skin with some type of organic matter that functions as a cover. In principle, for this first maintenance of the soil's skin, there should be no need of putting newspapers or cardboard again before applying the organic matter. Only if the cultivation area is heavily invaded with difficult-to-remove adventitious plants, would it oblige us to stop the cultivation of the affected surface, and put the newspaper or cardboard back in order to control them (see section V.1).

**Does the mulch have to be dry or green? Apart from straw, can I put another mulching?**

Organic vegetable matter can be green or dry like hay, shredded twigs and branches, fallen leaves, weeds, vegetable waste, pruning remains, etc. We have to take into account that once it is spread over the newspapers or cardboards, depending on the type of organic matter we have chosen, seed shoots could emerge that would germinate on the paper, not having the possibility of developing and therefore being added to the mulch (see section III.1).

**And that's it? Nothing else is done? Is any product poured for pests?**

Maintaining edible gardens with a high density of vegetables attracts all possible life into the area, creating the perfect conditions to obtain a natural balance of plagues and predators that secure healthy vegetables, plants, bushes and fruit trees (see section V.2). Biotopes, small water ponds with animal life and aquatic and / or semi-aquatic plants, are essential to create the right conditions by attracting a wide variety of beneficial fauna, from predators that facilitate the balance of the edible garden ecosystem and the environment, by at the same time they increase the biodiversity of the place (see section II.5).

In case we detect an occasional small plague or disease in a vegetable or plant, we do not have to intervene because the existing balance of our edible garden does not allow the plague to expand from one plant to another. It is better to observe than to act. The information that we receive by observing the plants tells us that the soil might not be completely balanced in this spot and that we have to wait until it balances itself. And,

if we needed to act, it would only be by giving more nutrients to the soil (see section V.2).

### **Surface composting?**

The Permaculture polyculture system is based on the patterns of nature. And since in this the soil is not plowed, its self feedback is based on the closing of the cycle with the fall of leaves that is the biomass that forms the cover in the soil creating the perfect conditions for life in it, creating a decomposition on surface - surface composting - leaving it spongy and nourished (see section V.1).

### **All these varieties of plants together, are they good? Do they make crop associations or rotations?**

In order to keep the edible gardens and garden forests constantly productive and with a high density of vegetation we use the hole planting technique, which consists of filling out all the spaces that have been created after harvesting the vegetables. In these spaces, we plant new seedlings without worrying if they are from the same variety that we have just harvested.

We do not use the crop rotation technique in this cultivation system since we have a permanent healthy soil that's being cultivated with the surface composting process, a soil with enough nutrients for all the plants. With this soil and the hole planting technique we ensure replacement and succession of the vegetables (see section V.2).

### **What irrigation system can I use?**

The ideal irrigation system for this Permaculture edible garden based on natural ecosystems is the sprinkler irrigation system because it resembles most to rain, wetting the whole surface, including beds and paths. This system humidifies the garden in a uniform way, which facilitates the decomposition of the organic matter and helps creating a rich soil life. This way, whilst irrigating the beds, the paths are also wetted. About a year later, we can harvest good quality compost from these paths. This compost will be used as substrate in the greenhouse or as extra nutrients for our beds. It is also possible to combine the sprinkler irrigation system with the drip irrigation system in order to manage the water use in places where it is scarce; or only use the drip irrigation system if the situation required it (see section III.3)

### **When do I have to irrigate?**

In order to know when to irrigate, we can touch the soil to check its humidity. In any case, it is important to take into account that the best time of the day to irrigate by sprinkling is in the morning or the evening in order to prevent the sun from burning the leaves of the plants. We can irrigate in the midmorning if the day is cloudy or if we use the drip irrigation system (see section V.4).

## Didactic Unit I - PERMACULTURE AS THERAPY



### I.1 Cultivating therapy

The Association for the Development of Permaculture (ADP) is a non-profit body created in Tacoronte, Tenerife, Spain in 2001. It is collaborator of Social Affairs of the Government of the Canary Islands since 2002. It was declared of public utility at state level in March 2011, Good Practice of the United Nations Human Settlements Programme (UN - HABITAT) in 2012 and of public interest of the Canary Islands in January 2018. Its main programme objectives are spreading Permaculture principles, along with the social integration and employability of persons suffering from mental illness, biodiversity of plants and animals and the participation in social volunteering. During 11 years, it counted on the Special Employment Centre (CEE-FEMP) (2002-2013) by the warmth of the Insular Plan of Psychosocial Rehabilitation (PIRP) for people with serious mental disorders of the Canary Islands Health Department.

*Finca El Mato Tinto* (FEMT) –headquarter of ADP– started its permacultural path in 1996 as of a Permaculture course held in the island. The course was the toolkit that channelled the concerns of the driving force behind the project. In fact, after travelling around the world in search of a life project in line with nature, the developer of the project found the solution in a permacultural mindset, even though he was not aware of it prior to the course. Twenty-three years later the center is an open learning center based on the trial-and-error method. The PERMIND Training Guide has become a great opportunity to standardize this experience and to keep progressing together with the project partners and in line with the ADP objective to spread the Permaculture principles.

The idea of creating the ADP originated at the end of the course, when a terrain of one hectare was available: El Mato Tinto farm (Figure I.1).



Figure I.1 - Images of the very beginning of the El Mato Tinto farm (1996-1997)

A farm of 10.000 square meters that has been designed according to Permaculture principles since 1996 and that turned into the nervecentre of a practice based on natural patterns. Through accurate observation and reflection, the environment becomes sustainable and its benefits are reinvested into the community as a way to recover the lost symbiotic relationship between city and countryside, as described by the Aristotelian principles of equilibrium, limit and *oikos*.

An experience that not only reaches the 10.000 m<sup>2</sup> of its nervecentre: its influence exceeds these limits thanks to the network created during the last 23 years. This network is composed by Insular Council of Psychosocial Rehabilitation and Community Action (CIRPAC); associations of families and persons suffering from mental illness; companies and neighbours of the area providing us with waste that we convert into resources; volunteers collaborating in exchange of training; the public administration on an European, national, regional, insular and local level; educational institutions; families that purchase ecological products from the farm every week. They are therefore linking the agro-food sector with the local economic development and involving the citizens in the philosophy of the project. A net that we will be able to present in the permacultural activities described in the following didactic units of this Training Guide.

The project grew out of a previous permacultural design where workshops are integrated along with animals that serve as therapy, edible gardens and garden forests, bioconstruction, renewable energy, seed management, creation of natural treatment plant for water management, local organic resources networks... And by doing so, not only create a close relationship in therapy, but also to get a healthier diet through the cultivation of soil and water. Twenty-three years of training thanks to the trial-and-error method. Since the very first moment the main therapeutic project has been the building of the center itself (Figure I.2).



Figure I.2 - Images showing various moments of the group therapy

## I.2 The experience of the Special Employment Center Finca El Mato Permacultura (2002-2013)

The Special Employment Center (CEE-FEMP) was established in 2002. The trust of its developer, the availability of a farm that had been cultivated with Permaculture principles for 6 years and the venture to start a project as a way of life were key to outweigh the initial obstacles of a family and a community that was resistant to a misunderstood project, and the reluctance of the embryonic ADP-group to include a social grant-based project involving Permaculture as a form of therapy in 1996. These same obstacles turned into opportunities for the developer, especially the strength created by the social project that involved people facing a double rejection: of their illness and of society.

Such determination made the promoter search resources for mental health and meet the Insular Council of Psychosocial Rehabilitation and Community Action (*CIRPAC in Spanish*), institution created by the Canary Islands government and subscribed to the Health Council for community services and psychiatric recovery.

In a context marked by a lack of mental health resources, the director of the PIRP (CIRPAC) encouraged the developer to create a Special Employment Center benefiting from the European project Equal Canarias Avanza 118, which promotes entrepreneurship in order to address disability (Figure I.3). The CEE-FEMP was created with a previous and successful business background of the promoter —the promoter dropped a previous company for this initiative—, with public health resources for the mental health of the Island Council of Tenerife and grants from the Employment Service of the Canary Islands of 50% of the official minimum wage for workers suffering from mental illness and the complete social security contributions from Social Security.



Figure I.3 - Images of the staff of the Santa Cruz de Tenerife Day Center (2002 – left) and of the CIRPAC with CEE-FEMP members (2008 – right), in different evolution stages of the Finca El Mato Tinto

When its developer learned about mental illness with the CEE-FEMP workers, the center turned out to be an opportunity for a shared education between the developer and its beneficiaries: for him it provided a higher capacity to face challenges and to the beneficiaries a higher self-esteem. The CEE-FEMP adopted the permacultural design principles as a method. Natural, personal and institutional patterns play a crucial role in this methodology, resulting in an infrastructure that is able to train and integrate every socially stigmatized group.

The sustainability of the project is inherent to the commitment of identifying Permaculture as a way of life, as a project of cooperation and of therapy. We are talking about a social company which staffs consist of a minimum of 70% of people with mental problems. Such a commitment reveals its social dimension (Figure I.4).



Figure I.4 - Image of some members of the CEE-FEMP permacultural family in a therapy activity with horses

Cultural and environmental aspects are addressed from the very conception of Permaculture: a holistic system that seeks to sustainably manage the resources for a mutual benefit of both humankind and nature. All of this is based on the principles of taking care of the land, its people and sharing its resources. “Taking care of people” brings the initiative to the institutional framework, specifically CIRPAC, –institution that provides the mental health resources map in the Canary Islands, and therefore to the legislative framework, social policies, sector strategies and other useful proceedings for its implementation and functioning.

From the point of view of the transferability of the CEE-FEMP, two levels can be distinguished: Permaculture as a way of life and Permaculture as therapy. These two levels are of course connected to each other. There are many transferability cases of the first level that are learned through various courses in the Finca El Mato Tinto. We have echoed about those in the PERMIND Training Guide introduction, which experience is spread and applied by the students within various personal and institutional frameworks.

Regarding the second level, there was a first one-year-long exercise of replicating in 2011 with the presence of an occupational center of the association AFES Salud Mental in the Finca El Mato Tinto through an agreement with the ADP. Such experience arose from an employment integration course for people suffering from mental illness that was organised by AFES in the farm a year earlier. In this course, the Permaculture principles were used, just as they are applied in the farm. The responsible persons of AFES designed the agreement after having noticed the positive effects of Permaculture in the rehabilitation of persons suffering from mental illness working at the Special Employment Center. In fact, when the integration course was finished, some of the students of the course did an internship in the CEE-FEMP and became staff. During this period (October 2011 - October 2012) there were several moments when CEE-FEMP employees and students from the Occupational Center were working together and supported each other (Figure I.5).

Later in 2014, another transferability experience with the Insular Institute of Social and Socio-Health Care of Tenerife (IASS in Spanish) took place involving the LASOS project, which we will explain later in this unit.



Figure I.5 - Coexistence of the employees of the CEE and the students of the Occupational Center watching the CEE-FEMP documentary for HABITAT – the UN Programme

Persons with mental health problems derived from mental health units, day centers, residences, supervised flats, directly from families and social affairs services of different city councils in the island. They were added to both the CEE-FEMP and the ADP. As we mentioned before, there were also many agreements with occupational centers, such as the Occupational Center Naranjos de Luz of Tacoronte and the one mentioned before that work with social groups and that develop permacultural activities in the center. Also a group of volunteers from the islands and abroad and people who carry out work practices through agreements collaborated in the center and were part of the mutual integration progress of any social group in the project.

The objectives that were targeted using this form of therapy include training and integrating persons with mental illness using the contact with nature and the Permaculture philosophy in order to provide enough tools so they can join the labour market afterwards.

The result of this therapy is a basic training, but still complete due to the various labour sectors it covers, which results in more job opportunities. Thanks to the mental health resources, a selection among the various pre-labour workshops –which develop skills in agriculture, farming, carpentry, construction, recycling– is made so the pupils join the one that fits best according to their profile (Figure I.6).



Figure I.6 - Images of the “Building the CEE-FEMP Therapy”

The **objectives achieved with the CEE-FEMP** are clearly reflected in the beneficiaries:

- Improvement of social and job performance by developing social skills that allows a correct communication with colleagues.
- Learning and maintenance of basic work habits (punctuality, compliance with the established working schedule, learn to respect the rules –both explicit and implicit that may have an impact on the coexistence and functioning in the work place, better perseverance in the tasks).
- Improvement of teamwork, being able to ask for help and to work with their colleagues.
- Improvement of basic cognitive skills such as attention, concentration, understanding and following instructions.
- Improvement of the development of the daily chores (better personal care, use of transports, care of the environment...).
- Improvement of future expectations for both the students and their families

Among the suitable processes needed to ensure the sustainability of the project, there is the financial one: the CEE-FEMP initiative emerged from the support of the Equal Canarias Avanza 118 project and the Employment Service of the Canary Islands. This resulted in beginning in 2002 with a ratio of 81% of external resources (subsidies) and 19% of own resources (agricultural production sales). By 2010 the situation was reversed: 32% of external resources and 68% of own resources. With the economic crisis of 2007, the ratios suffered due to prolonged delays of the subsidies of 50% of the salaries that the Employment Service of the Canary Islands had to provide. The delays were assumed by the CEE-FEMP, which endangered the ADP objectives. This situation was valued by the ADP and the decision to close the CEE-FEMP was made, without losing the therapeutic dimension of Permaculture. Since 2013, the ADP dedicated itself to other training formats as we described in the Introduction. The Association always had and still has the same therapy principles as those used in the CEE-FEMP.

### I.3 Evidence indicators of the role of Permaculture as a therapeutic experience

As a confirmation of the role of Permaculture as a recovery experience we transcribe several impressions of various persons that took part in the Special Employment Center Finca El Mato Permacultura or that were students and volunteers in the ADP experience (Figure I.7).

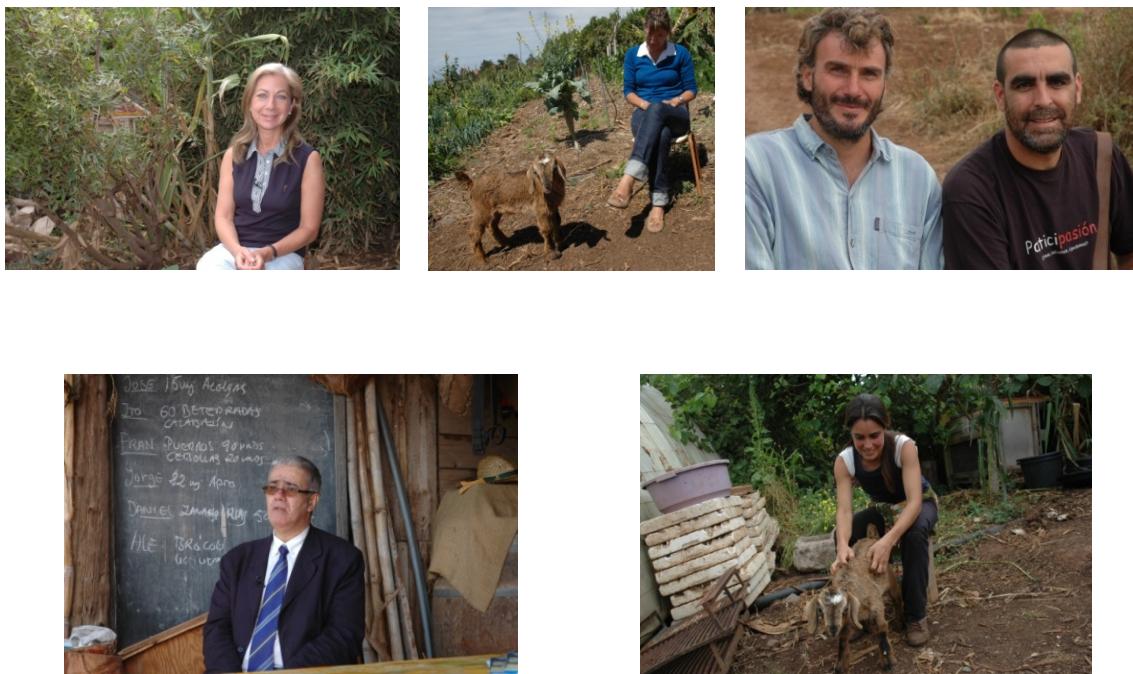


Figure I.7 - Images of CEE-FEMP workers and ADP partners

This transcription exercise evokes the role of the reports of the focus groups made in the evaluation of the PERMIND pilot projects implemented from this Training Guide.

Comments of the CEE Finca El Mato Permacultura directive<sup>1</sup>:

Javier, developer and manager of the CEE-FEMP: ...*The experience in this social company was very successful. At a personal level, it was very profound, I remember that to me it was very clear that I wanted to work on the social aspect of this permacultural project as a fundamental part, and it's at that point when someone told me that the social group of people with mental health problems was the one with the least assistance and resources since there were so many prejudices and too little information about it. But I didn't think twice and decided to help those wonderful people, who help me as well.*

Comments of the CEE-FEMP workers and relatives<sup>2</sup>:

Adán, CEE-FEMP worker: ...*here we help each other, we share the chores, we're always helping each other, supporting in everything... We meet afterwards sometimes to play football, to go to the beach, to hang out and to get to know more about each other... because I didn't know people... I could get a contract, and they handed me a job contract.*

<sup>1</sup>Personal comment of the driving force of the CEE-FEMP, Javier Reyes Barroso

<sup>2</sup>Excerpts from the interviews conducted in the documentary Centro Especial de Empleo Finca El Mato Permacultura

<https://www.youtube.com/watch?v=puRF6Id7vqE>

José, CEE-FEMP worker: ...Well I've been here for 2 months now and my colleagues are nice...Javi and Dácil, and to be honest they gave me the opportunity to be working here. It's my first time with fruit, animals, but I'm doing fine and they like it, so I'd love to stay here.

Ale, CEE-FEMP worker: ...this experience is great, I've been here for 5 years and a half, I can tell! I wouldn't change this for anything in the world, not for any other job or anything... Here we're really great, the truth is... things like this pioneer project here in the Canary Islands, I think it's the only Special Employment Center where we work together as a group of people motivated to use permaculture.

Jorge, CEE-FEMP worker: ...I've been here for about a year... I've got used to the vegetable garden, and it's such a beautiful thing. Here, nobody will hurry you, you learn a lot, Dácil and Javier keep on explaining things... and we go on little by little. To me, the farm is really beautiful... and God willing I'll retire here... I've got attached to the plants because it's our lifestyle... we sow them, they get bigger, we harvest and sell them...

Dácil, CEE-FEMP monitor: ...When there are meetings... at the animals... you can see they [the workers] are more relaxed, often smiling, joking a lot, here as well, but especially at the animals. You can really tell they are more relaxed... they lose track of time... and they keep on cuddling and even talking to them, and it seems really helpful for them.

Jorge's mother: ...I'm really pleased he's here because at least he's distracted and doesn't think... I can see he's doing great, really well... because these guys at least have another person helping them to get out so they don't stay inside, at home all day.

Jorge's sister: ...A great experience... to see him being integrated with more people. Being in this environment has given him the pleasure of talking to people and of having a social life just like a normal person.

### Comments of ADP students and collaborators<sup>3</sup>

Daniel, ADP student: ...I take care of the animals, I sow, do maintenance, remove weeds from the beds [in the garden], I've made beds, I've sown in the greenhouse, a little of everything. I've never worked as a farmer before, and to me, it's been the greatest experience I've ever had, cultivating soil. Here we're like a family, we help each other and get along very well, when we all meet to get breakfast at 10 a.m. we're always kidding, smiling, joking.

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<sup>3</sup>Excerpts from the interviews conducted in the documentary Centro Especial de Empleo Finca El Mato Permacultura  
<https://www.youtube.com/watch?v=puRF6Id7vqE>

*César, collaborator of the bio-box (a box of ecological fruits and vegetables): To me, the box is a form of social engagement... when I got to know this experience, the final result was the box, but what I actually liked better is what's happening before the box, the work done by Javier and his partner, by the guys and girls that work here, that was what caught my attention, from my point of view, the box is just an addition in order to conceive a better society.*

*Natalia, collaborator of the bio-box: ...it's a box that we come and get once a week; I come every Friday for example, a box filled with all the vegetables I need to nourish myself for one week... The fact that the people that are working here have certain problems and that a social work is done gives an added value to the product that I buy.*

*Verónica, ADP volunteer: Everything's possible, as my colleague said, with agriculture and animals. Meeting great guys, working with different groups and knowing that you're able to work with those people while developing what you've been taught... They create all of this themselves and give work to people that actually need it, people that weren't given the opportunity to have such a job.*

*Nieves, ADP collaborator: ...It's been fantastic to see that even nowadays, it's possible, I mean the salaries are created here, these people can keep on working and we develop a social and attractive core, very integrated and empathic too, and what's more, in complete symbiosis with nature.*

*Doctor Rodríguez Pulido (Director of PIRP -Insular Council of Psychosocial Rehabilitation of the Canary Islands Government): ...Breaking the isolation... In this sense this experience has a tremendous value. This is part of a resource that will become a strategic development for many others in the islands, but it's a very complex process. I hope this experience will light the way and give hope to many families and patients that would be able to look at themselves as if they are looking in the mirror, to see their promising future. We all hope these processes can keep on consolidating and growing.*

Since 2013 until the moment of finishing the final edition of the PERMIND Training Guide (August 2019), this therapeutic dimension, combined with the volunteering and occasional collaborations with mental health associations is still addressed.

However, the 11-year long, rich experience of the CEE-FEMP regains momentum thanks to the transfer of knowledge and replicability given by the Erasmus+ PERMIND project for the Training of Adult Persons through the implementation of various pilot projects, following the guidelines of this Training Guide.

The PERMIND project is inspired by the CEE-FEMP therapeutic experience and wants to research if this success could be applied under different conditions or backgrounds at a

European level or if it was just a temporary, positive experience made possible by other factors.

Permacultural and metaphorically speaking the PERMIND project represents the opportunity for **cultivating healthy human relationships** through the “therapeutic organic matter” that this Guide represents. An “organic matter” that we “water” during the Training Course for PERMIND Trainers; “we sow, plant and harvest its fruits” during the PERMIND pilot projects and at the end of the project we “recollect its seeds” in order to keep on cultivating healthy human relationships in the future.

We also talk about an innovative proposal of PERMIND in the field of improving working methodology, taking into consideration the personal needs and not only the technical knowledge, emphasizing the cross-sectional competencies for participation and social integration, employability and also learning as an active face of proposal itself through the creation and development approach.

For this reason the CEE Finca El Mato Permacultura therapeutic experience is not just a historic exercise but also an opportunity for the present and the future.

#### **I.4 Transferability of the Special Employment Centre Finca El Mato Permacultura therapeutic experience to the PERMIND Training Guide**

The transferability of the CEE-FEMP therapeutic experience to this Training Guide is raised at two levels: a) describing two therapeutic experiences out of the CEE-FEMP record we still utilize – Permaculture in the kitchen and *animated* Permaculture; b) transferring the therapeutic information from the CEE-FEMP Permaculture experience to the various permacultural design and care activities described in the following didactic units of this Training Guide.

With **Permaculture in the kitchen** we seek to reinforce the daily basic activities and raise awareness about gender equality among the students of our therapy centers. They prepare simple dishes, wash vegetables, learn how to prepare a coffee, a tea, toasts, boil an egg, etc... They learn how to organize themselves in different chores such as cleaning and tidying up, they gain responsibly by doing the dishes with less soap and water and keep both the kitchen and the dining room clean and tidy.

In our case we entrust this task to one or two pupils, depending of their autonomy, this person is called **The Caretaker!** During one week, this or these caretakers are responsible for taking care of the animals in the farm –feeding them and satisfying their needs– and also taking care of their colleagues–preparing breakfast with the products from the edible gardens and garden forests. Here, the monitors help the students in order to develop the creativity in the kitchen, by making colourful salads with our vegetables, fruits and edible flowers (Figure I.8).



Figure I.8 - Images of the edible therapy

We also help them to eat raw vegetables that don't need to be cooked, such as pumpkins, zucchini, leek, broccoli, cauliflower... developing our senses in tastings and decorating dishes in the most tempting colours and flavours (Figure I.9).



Figure I.9 - Images of various tasting compositions

The herbal infusions are made with aromatic herbs from our edible gardens and garden forests. Each week, the caretaker chooses two plants for the infusion so he can memorize them and learn the different health benefits of each plant over time (Figure I.10).



Figure I.10 –Herbal infusion made with rosemary and lemon balm from our edible garden

Once the caretaker prepared the breakfast, he rings the bell to let everyone know that they can sit down and gather around the table to eat (Figure I.11). This collective moment is a time of sharing, unloading, joking, laughing... In short, a time to create a sense of family, creating healthy environments and cultivating people.



Figure I.11 - Images of group breakfasts and the bell of the caretaker

**Animated Permaculture** – Permaculture with animals– is highly important for the bonds that are made between the students and the animals when they are doing care and maintenance chores, because then they are closest to them. This relationship with animals helps them to open up more, to lose fears, to make them more aware of the present moment, here and now, creating a feeling of wellbeing that they end up transferring to their colleagues. In this context we can notice relevant and important changes in their relationship with the others because they are sharing the experience with everyone. Hence the therapeutic importance of having different species of animals coexisting all together: it is a real source of inspiration for the students (Figure I.12).



Figure I.12 - Images of *animated* Permaculture

Regarding the transfer of the therapeutic experience practiced in the CEE-FEMP to the different permacultural activities of design and care described in the following units of the Training Guide, we can summarize this in the following headings:

### **The relevance of cultivating observation**

We talk about activities that result in opportunities to promote the observation, attention, concentration and memory, among other basic cognitive skills. In these activities we use the concept of a cycle. To observe and breathe what our natural surroundings tell us. Cultivating observation is an opportunity to reflect about the changes we need to make in order to achieve a good mental health. We cultivate observation, attention and the initiative to take care and protect our edible gardens and garden forests while observing the lifecycle, the biodiversity of plants and seed varieties we have in our edible garden. For instance, we organize an exhibition of the many vegetable samples from our gardens in various evolution stages. We talk about enjoying and learning through observation of the plants and the evolution of its flowers, from the moment we sow them, until they sprout, grow flowers and fruits and wilt and produce mature seeds. We encourage the students to observe the curious and magic design nature uses to get the seeds transported by wind and animals. We emphasize the importance to regularly visit the edible gardens with a group of students for maintenance tasks such as removing seedlings of unwanted plants. By doing so, the students will learn to distinguish and identify the seedlings of adventitious plants. We use tools such as a fish tank to visualize the soil so pupils can understand the different layers and functioning of a living soil.

### **The importance of searching for spaces and times of observation**

That means dedicating time to observe the beauty of our plants and to take a walk along the paths of life in our edible gardens. The moment when the seeds germinate is a very special moment for the persons that have participated in the sowing, since they can enjoy the view of the edible creativity they have made possible. It is important to

identify interesting places where our beneficiaries can observe and learn the various roles these places play. They can for example observe how during the rainy seasons the rainwater flows into the swales in the edible gardens and listen how it drops into the pond or how in a dry season the affluent of the natural treatment plant becomes a permanent pond.

### **Promotion of instructive and funny therapeutic activities**

We talk about shared learning, mutual help, job satisfaction, promotion of concentration, attention, appearance, relationships and interpersonal skills of all the students. We show the seeds germination tests as an example of a funny and educational activity: a unique opportunity for the students to reason and learn about photosynthesis, the nature's productive process by excellence. We trigger a feeling of curiosity for the future germination of the seeds they have sown, making them impatient and interested to monitor the sowing. We encourage them to see the difference between the seedlings of weeds and the ones of vegetables.

### **The importance of acquiring a sensation of belonging and fulfilment**

The students feel fulfilled and pleased when they observe what they have created, there is a feeling of well-being. We emphasize the feeling to belong somewhere with the role of the guided visits to the farm (Figure I.13) and with the foot and hand therapies in the bioconstruction workshops. These techniques are therapeutic because they are executed in groups and in a fun and dynamic way, for example, by stomping mud in a circle and listening to music.



Figure I.13 - Images that show the feeling of belonging. To the left a collage of pictures of different experiences of the CEE-FEMP workers and to the right an example of CEE-FEMP worker explaining his experience to the staff of the Santa Cruz de Tenerife Day Center in the edible gardens

### **The promotion of teamwork**

Encouraging the formation of groups promotes gender equality, team spirit and working skills with tools (Figure I.14). The formation of pairs is encouraged as well (its effectiveness among persons with mental illness is proven), developing their self-esteem, confidence, fellowship and communication. For instance: making a chain with the different students to transport the mud to the place where the wall is being made; forming a big human circle while stomping the mud in a therapeutic way; removing the mature compost from the paths in the edible gardens; whilst harvesting encouraging the most skilled person to teach another person or new students of the group, in order to take turns in the various jobs of the vegetable collection.



Figure I.14 - Images of teamwork

### **The importance of making designs in group to promote pooling among the students**

By pooling the different ideas of everyone, we can create a design that's practical and suitable for all needs, promoting in this way skills such as teamwork, consensus and conflict resolution. These activities stimulate organization and attention to care of more delicate chores, promoting creativity in the elaboration of the bio-box or the mandala-shaped design of the edible gardens, for example.

### **The importance of transferring the design to the real size**

This involves teamwork in order to take the measurements, to make the calculations and to develop the adequate skills to translate a scheme from paper to reality. Allowing the students to learn how to create a design and how to make it tangible gives them the opportunity to reach a higher level of self-confidence.

### **The importance of acquiring self-confidence through various techniques**

These techniques are opportunities to develop their intuition, commitment and patience. For example, in order to clean the seeds, it is important to focus on the task and to keep the mindset in the present, this way the students develop patience and

skills to face very precise and specific chores and it allows us to identify the relationship each person has with certain seeds. Executing chores such as sieving compost to fill the seed trays helps the students to develop mobility skills such as coordination when sieving with another person, a correct breathing and a correct posture. The customized technique of harvesting in the edible garden helps to acquire this kind of skills. They learn to be efficient in their work, to choose the proper tool for the job. They have the opportunity to use tools for small jobs so they can acquire new skills in a fun way. They can help with the building process, which creates a feeling of belonging and helps them feel fulfilled.

### **Opportunities to promote concentration**

The permacultural system helps to develop skills such as attention and balance. They work on their concentration in order to achieve a good and correct breathing and attention through a correct posture, always helped by their instructors. For example: while sowing and planting, putting more effort in concentration and attention through observation; the clay tests to check if it's suitable for the bioconstruction; with the measurements to realize many other activities.

### **Promoting the artistic dimension and the use of imagination among the students**

For example: personalizing a field notebook for the edible gardens to study and control the time a plant needs from sowing to harvesting, thus strengthening skills such as consistency in the notes in the field notebook each day, where grammar, basic mathematical calculations, creativity in drawings, etc are also worked; designing fact sheets of the properties of the edible flowers and aromatic herbs that are sold in the bioboxes, and that can be decorated by the students with the support of the instructors; in the allotments by creating rainbow-shaped colourful compositions of the plants in the beds or by preparing dishes with raw vegetables that were sown, planted and collected by them in order to develop their “edible creativity” (Figure I.15).



Figure I.15 - Images showing the therapeutic results of the “edible creativity”

### **The importance of instilling environmental awareness and promoting opportunities to socialize with the environment**

They stimulate social relationships, self-confidence, fellowship, mutual help... For example, instilling awareness about crucial resources such as water and soil; making little excursions in the farm and its surrounding area to collect material for the bioconstruction or to recycle material in order to identify different wastes that can be transformed into resources for our center.

### **I.5 Transferability of the Association for the Development of Permaculture therapeutic experience to surrounding social and health centers**

One of sources for this guide has been the ADP training dimension in the LASOS project framework described in the Introduction chapter. More specifically it is based on the training experience and transfer of knowledge with the IASS through a technical advice, awareness and permacultural design training services during 2015 and 2016 for IASS social centers in Tenerife (center for the elderly, childhood, persons with functional diversity, female victims of gender violence,...).

From the beginning of the LASOS project in 2014, IASS had been taking part actively in the specific social objective of the project: integrate Permaculture in the Tenerife social centers and benefit of its fields and vegetable gardens as resources for social integration. As a result of this experience of collaboration between social entities of the project such as ADP and IASS, an own IASS project was launched in 2015. Permaculture is the cornerstone in the educational, therapeutic and social integration activities in its social care and health centers (Figure I.16).



Figure I.16 - Images of replicability of the Finca El Mato Tinto experience in the occupational center Los Verodes (IASS) and a visit of the PERMIND partners to the mentioned center in order to observe the therapeutic potential of its pilot projects (26 October 2017)

This technical advice service of the ADP for the IASS allows us to identify another interesting exercise of transfer of knowledge and experiences replicability similar to PERMIND objectives. Such a transfer has the objective of visualize the PERMIND Training Guide replicability potential in terms of recent experiences that the developers of the guide have been involved in.

As an indicator of the evaluation of the transfer and replicability potential of the ADP-IASS experience, we write down some personal impressions of the IASS staff about the “Permaculture as a therapeutic and educational tool” training course that took place in the Finca El Mato Tinto in April 2016 in the second stage of the LASOS project (Figure I.17):

- *It's my first training and I loved it. A lot of tracks for feedback and enrichment of our health and social care are included, the care of life in its different ways.*
- *We're very interested in truly knowing this kind of cultivation. To add it to our own programs and develop it with our users (elderly). We're very excited to start.*
- *A very productive, enjoyable and rewarding experience. Information has been perfect, clear and understandable. I leave with the feeling of being able to design a permacultural vegetable garden with confidence.*



Figure I.17 - Images of various permacultural training courses in Finca El Mato Tinto for IASS centers staff

As a result of their first “ground connection” with the Permaculture in the farm, there are many reflections of the users from different IASS centers which could serve as a reference of the potential of the PERMIND pilot project co-creation with its own students. These visits were done in the visualization workshops framework developed in the first stage of the LASOS project.

Joint reflection of the users with functional diversity and the instructors of the Occupational Center Valle Colino after a visit to the farm on the first of July 2016 (Figure I.18):

*- All in all the instructors responsible of the group considered the visit as very positive, the users of the center had the opportunity to watch closely this different way to perceive, feel and work the crops and the connection with ecosystem. Many thoughts, critical views, curiosity and participation and debate about the possibilities of a similar project in our workspace emerged, along with motivation and initiative for each one's contribution to collaborate, to collect newspapers and coffee grounds, to get involve and start a new experience similar to the one in our own center.*



Figure I.18 - Images of the “ground connection” of the Occupational Center Valle Colino (IASS) beneficiaries and instructors and an ADP staff advice visit to the vegetable gardens of that occupational center

Reflections of the Children Service Day Center *Mundo Feliz* on July 11<sup>th</sup> 2016 (Figure I.19):

*-What they liked most was the part of the farm dedicated to the animals, since they could get into the farm, feed the animals and play with them, take pictures with the chicks on head of the children...; many of them told us they've never been so close to chickens, pigs, lambs, goats...*



Figure I.19 - Images of the “ground connection” of the students from the Children Service Center *Mundo Feliz* (IASS) to the Finca El Mato Tinto and ADP advice visits to that center

Impressions of a participant of the Female Victims of Gender Violence Center workshop on December 12<sup>th</sup> 2016 (Figure I.20):

*- Permaculture has helped me to understand a kind of education different from what we consider as normal; it's an education in touch with nature that promotes respect between the Earth and human beings along with other surrounding organisms. Both the experience in the center and the visit to the farm have fulfilled me as a person and have enriched my knowledge to be able to replicate this way of cultivating the soil in any place. I realized that it's something anyone can do in many locations and by doing so helping Mother Nature, that we're all part of. I want to thank the amazing team for its wisdom and experience on this topic but overall for helping us to learn.*



Figure I.20 - Images of the “ground connection” of the Women Center (IASS) users and staff in the farm and the course and its evolution made possible by the ADP with all of the users and staff of the center.

These evaluations may explain why ADP had requested the IASS to participate in the PERMIND project as an associated partner. As “non-official” partner, IASS has committed itself to the PERMIND project at institutional level and has promoted this approach based on the use of Permaculture as a therapeutic tool, all of it in a beneficial and mutual cooperation exercise.

From the very first moment the IASS fulfilled this commitment. Both in the kick-off meeting of the project in 2017 and in the Training for Trainers PERMIND Course in March 2018, the Occupational Center Los Verdes—an IASS center devoted to work with persons with functional diversity—was visited using the “ground connection” scheme in order to show a successful example of experience transfer of the El Mato Tinto farm, in the same way as the PERMIND pilot experiences (Figure I.21).



Figure I.21 - Pictures of the PERMIND Occupational Center *Los Verodes* visits during the kick-off meeting of the project (October 2017) (left) and the Training for Trainers PERMIND Course (March 2018) (right), in order to show a successful example of the transfer of permacultural therapeutic use of the Finca El Mato Tinto

## I.6 To summarize

We finish the first didactic unit “Permaculture as therapy” with two quotes that show the capacity of the use of Permaculture as a therapy and its potential of replicability. Quotes compiled as a result of the different “ground connection” and training exercises in the farm.

The first one is a synopsis of the dialogue between two women –Ángela González Belló and Rosario Guimerá Ravina– that took place in the ADP headquarter during the University of La Laguna Transdisciplinar Course on September 6<sup>th</sup>, 2016. Its title was “Dialogue about knowledge transfer experiences and other examples in the Finca El Mato Tinto”.

The speakers are two professionals that did not know each other but were linked by various “ground connection” moments in the farm: Ángela, an IASS professional, met the farm through visualization workshops and training courses within the LASOS project; and Rosario, a primary education professional, had assisted as a student to some interdisciplinary courses of the University of La Laguna that took place in the farmland also to a LASOS visualization workshop about the educational potential of Permaculture. The dialogue synopsis proves the potential of the training and therapy Permaculture:

*After the experience in the Finca El Mato Tinto, an opportunity to make changes to the employment and/or personal framework is created, and it even manages to transform ways of acting. Out of this, the following proposal arises: The Finca El Mato Tinto –as an inspiring place for different ways to connect us to the Earth and to the people– creates change processes in the ways of acting, and that's why this dialogue tries to share how a personal and professional “ground connection” can start transforming dynamics in the interrelation spaces. It's about sharing how the “ground connection” with the farm turned permaculture*

*into an integrated educational and therapeutic tool in different Tenerife's Social Care Centers devoted to persons with functional diversity, dependent elderly and unprotected children and teenagers; as well as serving as an educational work tool in the school centers and a crucial way of constructing social values during the childhood and adolescence, tempting primary school pupils to work and know about what's produced in the garden and to enjoy everything the garden gives them.*

The second quote is from an instructor of the Occupational Center *Los Verodes*, Carlos Barrios Cabrera –responsible of the permacultural replicability practiced in the mentioned center. The quote is the impressions he wrote as a way of evaluation of the training course for IASS technicians in the farm in April 2016. The technician had already taken part during the first stage of the LASOS Project during a visualization workshop in the farm in July 2014. Then he took notes of what was done there during the "ground connection" visit – they practiced and still practice ecological agriculture in the vegetable gardens of their center with an inclusion and integration approach for persons with mental functional diversity– and, subsequently, relying on videos of the ADP and following the trial-and-error method, began to put Permaculture into practice with his professional partner Miguel Viera Rodríguez in his reference center, converting it into one of the most valued spaces by the people helped in the center. These are his impressions about the course:

*The experience of having enjoyed learning the good manners and techniques of such skilled people in the permaculture world was really positive. Being able to watch in situ how they prepare the terrain and to get to know the details about how to start and maintain the garden will go a long way in the pilot experience that we're carrying out in our Center Los Verodes.*

*Obviously we can only be grateful for all the lessons and advices given that will be really useful for our experience. The results are very good and from now on I'm sure will only improve... All in all it is such a pleasure to have shared this time with all of you and an opportunity to keep learning about this wonderful permaculture world from the ones that know it the most.*

And we end with a third quote of Doctor Rodríguez Pulido (Director of the PIRP - Insular Council of Psychosocial Rehabilitation of the Canary Islands Government) on the virtues of Permaculture and its effect on the recovery of mental health:

*Permaculture as a therapy improves interpersonal relationships, cognitive skills, employment opportunities, and job skills through a broad network of ongoing support.*



Figure I.22 - Collage of images of the CEE-FEMP organization and its therapy of bioconstruction, craftsmanship, building of infrastructures in the CEE-FEMP and *animated* Permaculture

## Didactic Unit II.- DESIGNING THE PLACE



### II.1 Observation and reflection based on what we perceive

It is advisable and very useful for the monitors and managers of the therapy centres, to do in their area some training, workshop or introductory course to Permaculture Design to serve as an important complement to this PERMIND Training Guide.

A basic principle in Permaculture is **to observe first and reflect afterwards about what is perceived**. It is essential to spend as long as possible observing natural patterns and collecting data of the environment in order to design the mental health therapy center where we are going to implement the principles of Permaculture.

**From the very beginning, we will involve every person we work with in this task. A way to do so is to elaborate with them the design of the therapy center. With the help of the instructors, they can start drawing the elements of the project on the best location according to the collected information<sup>4</sup>.**

Once finished, the drawings can be put in a visible location. This way the beneficiaries can see them and they act as a motivation during the real design of the project. (Figure II.1)

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<sup>4</sup> With the green paragraphs, which will now appear in the rest of the PERMIND Training Guide, we want to emphasize on the therapeutic dimension of the PERMIND course.



Figure II.1.- As an example: drawings of the *Asociación para el Desarrollo de la Permacultura* (Association for the Development of Permaculture) therapy center

It is to be kept in mind that this project is alive, constantly exposed to the process of **trial-and-error** due to the observation and correlation of different elements of the design.

This trial-and-error methodology can be also applied as an effective therapy so beneficiaries can make it part of their own daily learning.

The design of a place depends on the area where it is located: the climate, region and altitude above the sea level. We have to take climatology, orientation, vegetation and culture into consideration so we can adapt us to the nature of the place.

Regarding culture, for instance, the contact with the traditional knowledge of the environment around our therapy center can provide relevant information for the project – such as information about the local traditional crops or the plant material suitable for the area, so the planning and continuity of the crops are ensured. **Collecting this information is also part of the training: with the help of the instructors, the pupils can visit the gardeners and farmers of the area, universities and agricultural research centers. That way, they can socialize and make known both Permaculture and recovery of persons with mental illnesses.**

This information will also allow us to identify the existing seed network and marketing channels we can link our future permacultural production with.

## II.2 Climatology and orientation of the place

**Identifying the climatology and orientation (North, South, East and West) allows us to learn with the students in order to make use of all our senses whilst observing. Visiting some local meteorological center or practicing with the compass on the terrain, for instance, are ways to do so.**

Thereby we will be able to know where the warmer and colder areas are, so we can locate the different elements related to the permacultural therapy center on the drawings.

We can then place the edible garden on the warmer area and as close as possible to the main infrastructure of the center, whether it is a house, a workshop, a classroom, a tool room, a greenhouse... The main infrastructure will be used as a reference and starting point in order to make the commercialization of the vegetables and crops as efficient as possible.

The animal housing can be placed in the following area. Animals have a high therapeutic value so their presence on the project mustn't be underestimated: The fact that different species of animals share the same enclosure is a source of reflection and inspiration for the beneficiaries (Figure II.2). Even if it isn't possible to house different species together, it is still advisable to have a farm with just one species or several separated. This animal housing should be fenced so that the animals cannot reach the edible gardens.



Figure II.2.- Animals in coexistence (*animated* Permaculture )

The parking and the access to the center can also be placed close to this area. By doing so, it acts as a barrier and eases the farm maintenance since it is next to the edible

garden waste and the resources brought from outside –such as animal feed, materials, etc. The animal housing can also be used as a visiting area.

In the next area we will locate the grazing ground –preferably evergreen– that will act as biomass for mulching of the edible gardens and/or for animal feed, if needed. The rest of the areas will be covered by edible garden forests, which will be described in Didactic Unit IV. The most suitable kind of pasture depends on the climatology of the region. The agricultural and/or livestock research centers of the area can provide this information.

The setting will be made along or around the main infrastructure, depending on its location and conditions –dimensions, shape, access, water availability, present buildings and forests (Figure II.3).

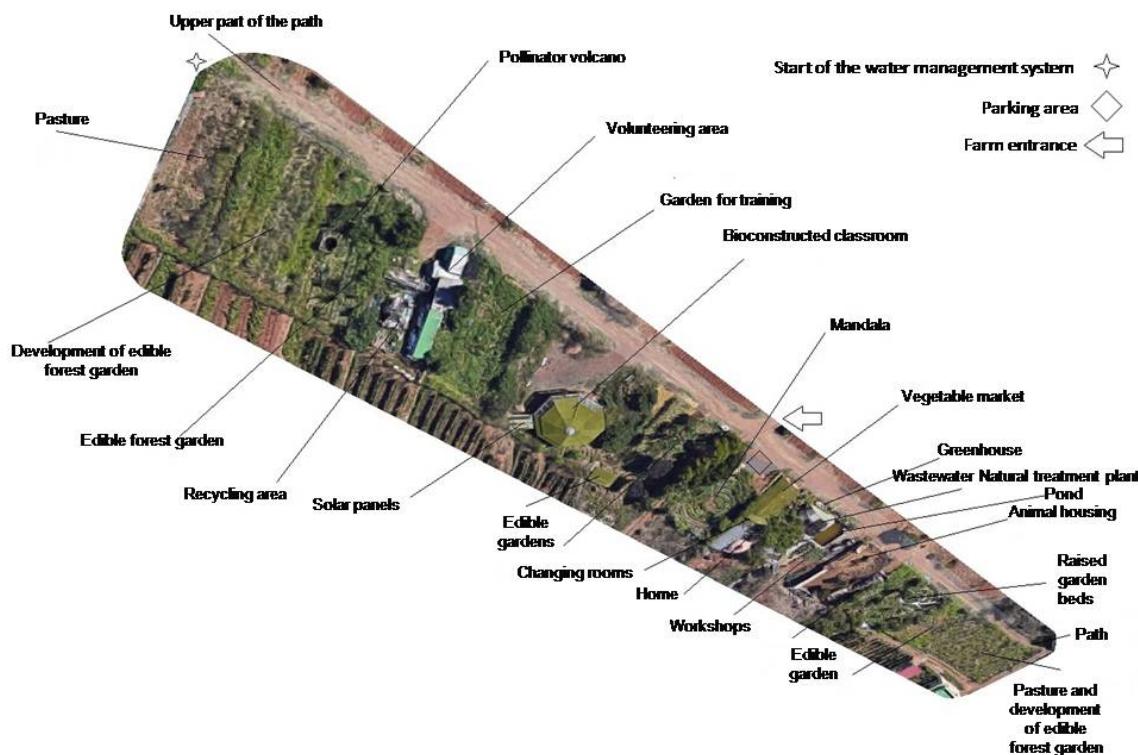


Figure II.3.- Zoning in the therapy center of the Association for the Development of Permaculture in *Finca El Mato Tinto*, Tacoronte, Tenerife

If the infrastructures were to be built from scratch, the bioconstruction techniques could be used, which we will talk about in the Didactic Unit VII, techniques with a high therapeutic value.

It is advisable to build the infrastructures as close as possible to the main entrance so the access is quick and more accessible and therefore requires little maintenance.

When drawing the plan of the center, it is very important to link different zones of the project. This way, we can ensure as much closed cycles as possible. For instance: the water to irrigate the edible garden will be collected from the roofs; the cleaning residues of vegetables of the edible garden will provide animal feed or mulch for the edible garden itself; pastures will provide feed for the animals and mulch as well; animals will ease the therapy for our pupils as well as produce nutrients to be used in the greenhouse or the edible garden; the edible garden forest will provide fruit, mulch, firewood for the kitchen; and so on (Figure II.4).



Figure II.4.- Different images showing the links of the project in terms of closed cycles

The systemic nature of Permaculture ensures networking between the different elements of the project. Every element meets different functions interconnected and supported by each other.

In the following paragraphs we will talk about the importance of different components of the design of the place –such as water resources, hedges, biotopes, the “pollinator volcano” and the waste/resource network.

### II.3 Water harvesting

Water is a very important resource and has to be strategically designed in the project. Most of the water resources of the therapy center will probably come out of external water supplies. However, some other water resources can be generated through water

catchment and waste water treatment. We will talk about these resources under the concept of water harvesting.

Whether we are designing a new place or redesigning an existing one, the possibility to divert rainwater towards swales should be taken into consideration. Swales in paths and roads can be used benefiting from any land inclination (Figure II.5). The swales are long excavations in contour lines made along the ground that allow the infiltration of the water into the subsoil. The width between swales is about 3-15 meters approximately, depending on the land unevenness and extension (Figure II.6).



Figure II.5.- Water diversion channels in the road



Figure II.6.- Swales for the rainwater in the plot

In case we have infrastructure with roofs but don't have a pond to store water, the water can also be diverted towards these channels. That way we benefit from the nutrients entailed, elevate the groundwater level of the area and avoid erosion. This contributes to more available underground water, which is very beneficial for the roots of the trees, especially during droughts and summer.

This rainwater catchment system consists of helping the rainwater to enter the water diversion channel in the top part of the slope. From this top channel the water continues gently until it reaches the overflow at the other end of the channel.

In case of heavy rain, when the volume of the water getting into the swale is bigger than the water currently filtering, the water level would rise and the overflowed water would pass into a second swale connected to the first one (Figure II.7). And so forth until the water reached the swale in the lowest part of the slope, where it would overflow and pass to a path, road or creek.



Figure II.7.- Swales in an edible garden with raised beds

Another way to catch rainwater is to capture it in the soil of the allotment itself. The sponginess of the good cultivated soil –which we will talk about in Didactic Unit III– allows all the rain that falls on the beds and paths of the edible gardens to be absorbed into the soil of the garden (Figure II.8).



Figure II.8.- Images of the spongy soil

A third way to catch the rainwater is to channel this water by connecting every roof of the infrastructures of the center with the pond –where it is stored for its latter use (Figure II.9).



Figure II.9.- Channelling and storage of the rainwater on the different roofs

Channelling the rainwater from the paths to a system of little ponds is also a possibility. In this system, the dirty water enters into a first pond where the dirt settles down and the water passes to a second pond. This process is repeated in the next little ponds until the water is clean enough to be stored in a bigger one for its latter use (Figure II.10).



Figure II.10.- Channelling, decantation and storage of rainwater from the paths

Depending on the size and distribution of the place, there may be one or more ponds.

The aim of this water catchment is to keep all –or most of it– in the therapy center so we can efficiently manage rainwater.

In order to close the cycle of the wastewater of the center, we can build a water treatment plant made of plant filters and reused materials. **In any case, it is mandatory to build it under permanent technical supervision in order to size the treatment plant correctly.** The amount of water needed by each person and the climate and regulation of the area are to be taken into consideration. Wastewater

usually comes from toilets, showers, sinks, washing machines,... Once the water is treated, it can be used to irrigate, stored in ponds or diverted to swales.

By means of example, we explain the construction of a natural grey water treatment plant. It has been designed on an empirically calculated scale for approximately 10 people in the mental health therapy center of the Association for the Development of Permaculture. In this case, it is only grey waters because when using dry bathrooms, we do not have sewage.

First we have to make sure the treatment plant is placed below the level of the wastewater effluent of the center. This way we can collect and divert all the wastewater to the treatment plant so it can be used to irrigate or stored.

We have made an excavation to bury the vessels below the effluent pipe. We used 4 linked reused vessels with an approximate capacity of 1000 litres each (Figure II.11). The vessels and their linkages have a slight slope to make the water flow from the first to the fourth vessel by gravity action.



Figure II.11.- Setting of the vessels and linkages

The first vessel is the closest to the effluent of the wastewater and acts as digestion tower for fats, salinity and organic matter. The effluent pipe enters the vessel through the top, at surface level.

We filled two thirds of its capacity with reed or bamboo and the rest with thatch. It could also be filled only with thatch. The canes have to be cut with a slightly smaller size than the diameter of the vessel so they can be placed horizontally (Figure II.12). At the end of its placing, a weight is added so that they are submerged when the vessel is filled with water. In these vegetable fibers is where the necessary habitat for microorganisms to develop over time in a natural way, microorganisms that will be

responsible for purifying fats, organic matter and minerals. If we want to rapidly increase the microbial fauna and thus to advance the process of water purification, it could be possible to inoculate microorganisms with *Bokashi* (Wikipedia). This first vessel has to be tightly closed with a lid. In this first vessel, the fats are caught and eaten by the microorganisms that thrive in the fibres.

The water leaves the first container due to the siphon effect through a long tube from the middle of the tank at the area closest to the second tank. The upper part of the pipe end is **T-shaped** so that water enters by gravity action into the second vessel. This last tube arm is closed with a lid so that the water can be extracted to the object for analysis. (Figure II.12).



Figure II.12.- Inner composition of the first vessel and connection with the second vessel

The composition of the three remaining vessels is as follows: a 20 cm layer of fist-sized stones was placed on the bottom to serve as drainage; a geotextile mesh was put on the stones so it acts as barrier for the roots; then a volcanic aggregate, preferably porous, fills the rest of the vessel to favour the growth of as many microorganisms as possible. In case of not having volcanic aggregate, gravel or any similar material can be used. Each vessel is filled with aggregate until the tubes of connection are covered (Figure II.13).



Figure II.13.- Inner composition of the remaining vessels

As explained before, wastewater from the first vessel enters the second one through a tube placed on the upper end. This way water is decanted through the surface of the aggregate towards the drainage. Once there, it siphons through a long tube that goes up from the drainage to the other upper end. The water goes to the third tank, through a lengthened tube, attached 20 cm above the bottom that rise from the drainage. The tube has a T with its lid of control record, maintenance and analysis. The same connection was made between the third and fourth vessels, ending the fourth in the vent.

The three vessels once filled and full of water are planted with water plants, which are preferably native. For the first vessel with aggregate we used bulrush, reed for the second and the third one was sown with a wide range of plants. Most of them blossom, produce flowers –such as lilies of different colours or calla lily– and beautify the place as well as attract animals so our students benefit from it (Figure II.14). In the first test results, one month after the implementation of our plant the treated water was found to be suitable for irrigation.



Figure II.14.- Sequence of images of the plant material used in the sewage treatment plant

**With these alternative ways of harvesting water we can raise awareness about how essential the resource water is. Our beneficiaries are also brought the possibility to observe how it flows through the swales during the rainy season, watch and listen it falling into the pond or observe how the affluent of the treatment plant becomes a permanent natural spring during the dry season.**

**The musicality of these situations becomes a strong therapeutic element.**

#### II.4 Hedges as borders for the ecosystems

One of the most important steps during the observation process is the identification of the wind direction, especially that of the prevailing wind and the strongest and most

destructive ones. This information will be useful to place the evergreen grove on the boundaries of the therapy center as hedges.

This hedge row can be composed of trees and evergreen bushes, preferably fruity and native since they are more resistant due to their acclimatization (Figure II.15). The hedges serve as barriers that will soften temperature and humidity, slow down wind, attract biodiversity and protect our permacultural structure.



Figure II.15.- The *Myrica Faya* from the Laurel forest (Canary Islands) as part of the hedge provides fruit, wood, biomass, fodder, fixes atmospheric nitrogen and serves as haven for the nesting birds.

The bushes should be planted in a row to meet the function of wind breaking and protection. They should be planted 1-1.5 meters from each other to accomplish an efficient thickness (Figure II.16).





Figure II.16.- Planting and evolution of the hedges

Hedges will also provide biomass for the soil cover of our edible garden, wood, fruit and pasture (Figure II.17), as we will be able to see in the following didactic units.



Figure II.17.- Fallen medlar leaves, used as hedges, acting as biomass for the soil

They will also help attracting native animals since they provide the right conditions for the birds to nest (Figure II.18). Therefore this contributes to the biodiversity and the equilibrium of the environment.



Figure II.18.- Images of a nest under construction and another already made

**The hedges area is another interesting place for observation and learning for our students since it can show its various functions (nesting, sighting of birds and other animals, protective screen, biomass generation, fruit harvest, ...).**

## II.5 Biotopes attracting animal life

The surroundings of the hedges are the best place to create biotopes, small places to attract life as the name itself indicates. A biotope is a small pond where dragonflies, frogs and toads can live with aquatic plants –such as lilies, hyacinths, water lettuce, duckweed– or semi-aquatic ones –such as lilies and rushes. Native animals can benefit from this water and we can search native aquatic and semiaquatic plants acclimatized to the area.

The function of these plants is to oxygenate the water and to keep it clean so it attracts wildlife. These can be predators that restore the balance in the ecosystem of the edible garden and its surroundings and increase the biodiversity at the same time. The biotopes should be placed on shaded areas and not too exposed in order to facilitate the arrival of animals.

**The biotopes always become an interesting place for observation and research therapy for our beneficiaries. They can relax and enjoy the surrounding wildlife (Figure II.19).**



Figure II.19.- A fully operational biotope integrated in an edible garden

We can build the biotope with used materials such as old bathtubs, basins, barrels or any other container able to store water. Biotopes can be fully or partly buried after making sure there are no fractures or cracks (Figure II.20).



Figure II.20.- Construction stage of the biotopes with reused vessels

The use of some fabrics such as burlap, used carpet or artificial turf to cover the edges of the container is advisable. Once the cover is under water level, it will help any small animal that accidentally falls into the biotope to climb out of it.

We will use stones or trunks to set the edges and to keep the cloth tied up. A stone big enough to excel the water surface in the middle of the biotope would be helpful for birds to sit and drink (Figure II.21).



Figure II.21.- Artificial turf –tied up the edges by stones– covering a biotope, and the central stone where the birds rest

Once the biotope is finished we fill it with water and put the plants or pots for the semi-aquatic ones. This way it gets integrated in the environment and becomes an oasis for small animals.

The use of a chock on the bottom to keep the semi-aquatic plants over the water surface level is advisable too (Figure II.22).



Figure II.22.- Aquatic plants in a biotope in pots

The maintenance of the biotope is simple. A pruning of the excess of plants surrounding the biotope should be made at least once a year to keep its condition of oasis.

Also we have to ensure that a third part of the water surface is free of plants. This will facilitate the water oxygenation and the easy access of small animals (Figure II.23).



Figure II.23.- Biotope covered by duckweed without covering all the surface of the water

The plant material from that pruning and the one that's drawn from the biotopes can be reused, as we will learn in the edible garden maintenance unit.

We could also place an insect hotel next to the biotope, especially if we have our own isolated edible garden in an urban area (school or urban orchards, roofs, balconies) to attract as much as beneficial fauna as possible (Figure II.24).



Figure II. 24.- Different insect hotel designs

## II.6 “Pollinator volcano”

A “pollinator volcano” is a haven for our friends and allies: the bees, which are the most important pollinators. Not only our edible gardens and edible forest gardens benefit from their pollination but also the whole area around (Figure II.25).



Figure II.25.- Our friends and allies the bees

In order to integrate one or more hives safely in our plot of land we use what we call “pollinator volcano”. It allows us to work close to the hives without any risk of sting. We named it like this because it has the shape of a small volcano (Figure II.26).



Figure II.26.- The construction evolution of the “pollinator volcano”

If you were able to design a “pollinator volcano”, it would be really helpful to increase the pollinating potential in the area. In addition we would have the opportunity to learn about the bees, work with them and moderately obtain their products such as the wonderful honey, *propolis*, pollen, jelly... These excellent products are beneficial for the balance and health of our bodies.

The presence of a professional beekeeper would be needed to help us in the maintenance and harvesting process and to teach our users about them: their social life, the responsible handling of the hives and how to efficiently interact on set times. The students love this activity.

The purpose of the cone shape of the structure is to make sure the bees fly high enough when they leave their shelter— the hives inside the “volcano”. Therefore the bees no longer present a threat outside the “pollinator volcano” for any person around (Figure II.27).



Figure II.27.- Coexistence between beneficiaries and bees in the edible garden forest

Materials such as wood or iron tubes –preferably used– are required for the construction. These would be used to build a cone with a diameter of 5 meters on the base and a height of 3.5, leaving a circle with an approximate diameter of 3.5 meters on the top of the cone. This minimum height of 3.5 meters between the hives and the upper part ensures that the bees are no threat for anyone around the “volcano” and that neither do we for them.

We have to keep in mind during the construction that we need some space for an access door to the hives inside so the beekeeper is able to do routine maintenance (Figure II.28).



Figure II.28.- Access door to the “pollinator volcano”

The structure has to be firmly attached to the ground and covered around—except for the door and the top which we will leave free – by any metallic net or wire mesh with very small holes that bees cannot go through. By doing this we make sure bees are able to exit the cone only through the top. Therefore we will never be on their flight path, no matter if they exit to recollect pollen and nectar or return to the hive.

The outside part of the “volcano” structure should be sown with vines and melliferous plants – and better still if they give edible fruits- plants which would climb up the net or the wire mesh. Given this plant cover, we would obtain fruit while the bees and us would not disturb each other. It also makes the “volcano” integrate into the landscape harmoniously (Figure II.29).



Figure II.29.- Integration evolution of the “pollinator volcano” along with passion fruit

The ideal place to set the “volcano” would be in the edible garden forest.

**In case we had a carpentry workshop the course students could make boxes for the bees using a construction plan. If it was not the case, the hives could be bought on the market.**

The box or boxes have to be lifted from the ground with pallets of bricks to keep humidity and waterlogging away during rain seasons. We suggest a maximum of four hives boxes in a row for the area of the “volcano” (Figure II.30).

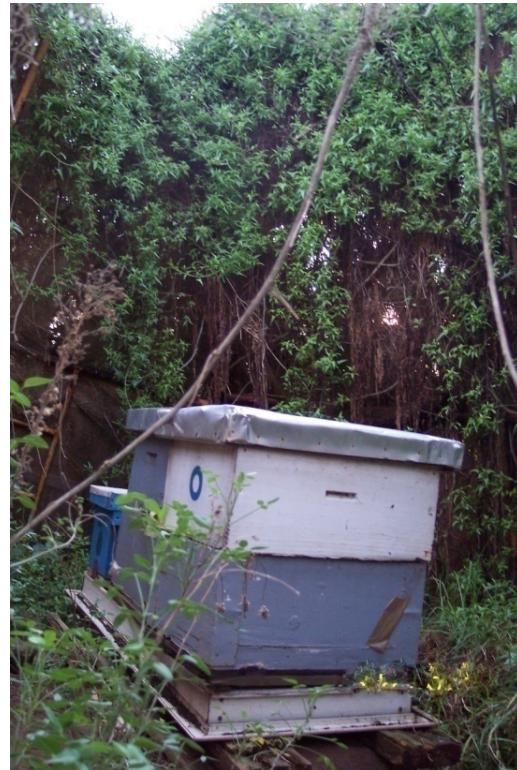


Figure II.30.- Hives boxes inside the “pollinator volcano”

## II.7 Wastes and resources network connected to the neighbourhood

In the design of the place it is very important to keep in mind the need of a network to manage the conversion of waste into resources. It is important and necessary to survey the area or any neighbourhood, village or city in order to identify the waste produced by our neighbours. We can take advantage of this waste as part of our permacultural project in terms of mutual support. **This task serves to re-educate and raise awareness within society about the need to cool down the planet together – some take responsibility of part of the waste while others use them as nutrients to be turned into food.**

If there were already any relationship in collaboration with the neighbourhood it would be a great chance to deepen it.

The “waste” materials we talk about are newspapers, cardboard, coffee grounds, garden pruning, woodchips, waste from cellars, bottles, logs, stones... They are resources that prove to be strategic for the design and maintenance of the edible gardens, as we have already mentioned in this unit. We will address a review about it in subsequent units (Figure II.31). The collection of these resources can be done throughout the year. We will need a place in the center to store them.

**The beneficiaries can get involved in the recollection of the materials, which also proves to be a great opportunity to interact socially. The contributing neighbours could be invited so they can get to know the center and, if possible, guided by the beneficiaries themselves. This way the whole process becomes a very inclusive activity.**



Figure II. 31- Examples of collaboration of the waste-into resource network

## II.8 To summarize

**By integrating the Permaculture principles into our centers, we are inculcating our beneficiaries and making them conscious of the importance of a fair distribution and a responsible use of the resources of Mother Earth. We also prove that we can be more than self-sufficient with a right management of the environment.**

**While learning how to design this place we give our students the opportunity to build self-confidence. In general, we are not used to observe our environment in order to learn from it and to adapt our lives according to our observations.**

The purpose of this didactic unit is to organize the information obtained from this place so it provides a comprehensive approach and makes us think of the changes we need for a better mental health. The humankind has been able to destroy nature but here we suggest a new life scheme that is able to heal it. The path to do so is to organize our thoughts in order to find out how to coexist with both the environment and ourselves and to understand the mental patterns of our nature (Figure II.32).



Figure II.32.- Sight of the classroom of the Association for the Development of Permaculture, bioconstructed by the beneficiaries and integrated within the environment

## Didactic Unit III.- DESIGNING OUR EDIBLE GARDEN



### III.1 Cultivating soil

We have already located the garden; now it is time to start designing it.

We start by cleaning up the area we have chosen to design our edible garden. This would be a first teamwork activity between the beneficiaries. We remove, if necessary, rocks, weeds and holes with the purpose of making the surface as level as possible.

Unless we want to make our edible garden with raised garden beds, technique that will be explained later on in this didactic unit, the soil could be ploughed one last time if it is too hard, even though it is not recommended since it would destabilize the soil life. If there is a lot of grass, it could be good to use a brush cutter or to cut them manually, spreading them out on the floor and soaking them. We can also use animals, such as hens, ducks, geese or pigs, building a corral which can be fixed or movable, with shadow and water so we can leave our animals in enough time, which will be when the field is grass free and fertilised by the animals.

It is important to install at least a biotope in the edible garden. For that purpose, we choose the location and we build it first, integrating it into the garden with plants and borders (Figure III.1).



Figure III.1.- Built biotope in the edible garden

Now, the land is ready to be covered with an even layer of compost, which will be, **at least, between 15 and 20 cm high**. This is the most important task we have to achieve if we want to have good permanent results from the first year on. We must never extend a layer thinner than 15-20 cm of compost, even if we want to have more farmland. It is better to have less space with the minimum compost suggestion than trying to get more surface with less compost. If we don't have enough compost, we will only place it in the allotments, getting this way a lower path. If this is the case, we need to design the allotments in advance so that we can extend the compost in them (Figure III.2). Once this work is finished, we soak the compost without flooding it.



Figure III.2.- Compost distribution in the edible garden and compost distribution only in the allotments

It is necessary to find a good quality compost to cultivate. This can either be an organic vegetable compost, an animal compost or even a mixture of both. If we dispose of our own mature compost it could be enough to start (Figure III.3). If we needed large amounts we could obtain it from a nearby farmer by exchanging it for other products if both parties agree.



Figure III.3.-Mature vegetable and animal compost from the ADP farm

We now cover the compost with used newspapers and cardboard that's not laminated or coloured. By doing so, on one hand, we stimulate the conditions for a rich soil life and, on the other hand, control the weeds and maintain the humidity. This process reuses and transforms the cellulose from the used newspapers and cardboard into resources (Figure III.4).



Figure III.4.- Newspapers and cardboard storage

We will spread the paper or cardboard over what will be the paths and beds of the edible garden. The way of arranging is crucial in order to control the weeds during several months, or even up to a year. We have to take into account, when placing the paper or cardboard on the ground, to start from the inside to the outside so we do not step on it; and, in the case of not wanting to remove trees or plants that might be in the garden, we could surround the trunk or stem with the newspapers or cardboard (Figure III.5).



Foto III.5.-Arranging paper around plants and trees

In the case where the land has a slight slope, we would start placing the first layer of cardboard or newspapers from its highest point to facilitate the water –be it from the rain or the watering system– to retain in the soil easily thanks to the overlapping technique that will be explained next.

The newspapers are always placed wet, using buckets filled with water where we put them folded in order to soak them. The papers stick better to each other when they are wet; they spread out more evenly and don't have as much bumps. By wetting them, we also avoid them getting lifted by the wind. Once the newspaper is soaked we open it in the middle and place it on the ground. If the newspaper is very thick we can divide it into two.

We place the newspapers on the ground the following way: we start to assemble the first row on one side at the end of the garden with the first newspaper spread out over the compost; we overlap the second newspaper over half of the first one and continue until the first row is finished. We overlap a newspaper after another so that we create and first layer that will reach the other end of the area we want to cover.

The second row follows the same technique, but taking into account that the newspaper of the second row also overlaps half of the newspaper of the first row, and so on and so forth. We will form this second row following the same technique until the area is covered from end to end (Figure III.6). If it is correctly done, there is a minimum overlapping of four layers of newspaper in the whole covered area, except for the edges, which could be fixed by adding newspaper or cardboard. This prevents grass from sprouting and easily breaking the newspapers due to an incorrect overlapping. The thickness created by the newspaper is also helpful on areas struggling with adventitious plants hard to remove. If this was not the case, we could divide the newspaper three or four times and follow the same procedure to cover the compost.



Figure III.6.-Assembling the newspapers on the ground

**For this work, we could form pairs with our participants in order to cover each row with newspapers or cardboard. Each group would do a small section depending on the size of the edible garden and the number of participants. To work evenly, each pair would have a pile of newspapers and a bucket with water; one person, after wetting and opening the paper, would pass it to the other one, who would place it over the compost according to the procedure described. Every so often the pair would switch so they could do both activities (Figure III.7).**



Figure III.7.- Assembling the newspaper in the edible garden with a group of students of a course organised by the ADP

Since several pairs will work in the same row, there will be times when two groups run into each other. To avoid an incorrect overlapping in these areas it is important to make sure that the requirement of four overlapping layers is satisfied.

If this work was done with cardboard it would have to overlap the same or more than newspapers since the cardboard moves easily. Afterwards, we wet the cardboard with a hose to secure them and to make sure the wind does not blow them away. It is important that the dry cardboard is not stepped on once they are put in the correct overlapping position since as said they are moved very easily and the purpose of overlapping them would disappear. Cardboard has the inconvenience that since it decomposes more easily and quickly than newspaper allows grass to sprout in a shorter period of time.

**It is crucial that the people responsible for monitoring the activity take part in the process to ensure that there is a good cover of newspapers and cardboard. This allows everyone to learn, share, help each other and enjoy the work and by doing so improving concentration, attention, interpersonal relations and skills.**

The next step is to cover the newspaper or cardboard with organic vegetable matter, which will act as our mulch. Before placing it we have to make sure that the surface of the newspapers or cardboard is wet. If the surface were to be dry it would be necessary to wet it with a hose or the remaining water of the buckets. This would have to be done with caution: firstly, because the paper or cardboard could move if the pressure of the hose is too high or if the water from the buckets is thrown out too

suddenly, and secondly, to make sure the water reaches the ground easily through the overlaps (Figure III.8).



Figure III.8.- Wetting the newspaper before placing the organic matter

Organic vegetable matter can be green or dry like hay, shredded twigs and branches, fallen leaves, weeds, vegetable waste, pruning remains, etc. We have to take into account that once it is spread over the newspapers or cardboards, depending on the type of organic matter we have chosen, seed shoots could emerge that would germinate on the paper, not having the possibility of developing and therefore being added to the mulch (Figure III.9).





Figure III.9.- Different types of organic matter (hay, grass and vegetable waste, woodchips and plant twigs and branches)

We cover the surface of the newspaper or cardboard as evenly as possible with the mulch we have, adding a layer of 5 to 8 cm, which will be decreased by half once it settles down after a week (Figure III.10). It is important to take into account that if the wind leaves a clearing in the mulch we have to add more to maintain the same thickness. We cannot forget to water it all again once we have finished placing the mulch.

The thickness of the suggested mulch is appropriate for vegetable crops. If we wished, for example, to obtain potatoes we should add double or more of organic matter to provide tubers with more room to develop, also preventing them from spoiling.



Figure III.10.- Mulching over newspapers with hay and over the cardboards with woodchips

It is important to bear in mind with this activity that every piece of newspaper or cardboard in the edible garden needs to be covered with mulch to prevent the uncovered paper from drying out from one day to the next and being moved by the wind (Figure III.11).



Figure III.11.- Terminating the activity by covering the newspapers and cardboard with organic matter

The organic matter will be added from the outside to the inside, the opposite way of the assembling of the newspapers and cardboard, with the objective of stepping on the organic matter while it is being added and never directly on the newspapers or cardboard (Figure III.12).



Figure III.12.- Placing the organic matter on the edible garden without stepping on the newspapers

We have to be aware that all the water that has been added from the start of this process will stay in the soil without evaporating thanks to the mulch. Furthermore, as a whole, it will provoke decomposition and the addition of nutrients to the garden soil.

### III.2 Drawing our allotments

**When designing the allotments, it is recommended to work previously in the classroom forming small groups with the participants so they can draw their design**

**of the edible garden; working this way allows to share ideas and to do a practical and appropriate design according to their necessities, and encouraging abilities such as teamwork, coming up with a common consensus, problem solving, etc.**

We recommend designing round shapes, like mandalas, that serve as harmonious edible gardens and can create a therapy and work environment at the same time (Figure III.13).



Figure III.13.- Examples of mandalas

Once the final design of the edible garden is chosen we transfer it to a real-size version of it on the ground outlining it with used coffee grounds, pegs, small stones in strategic points, thread, strings, etc. (Figure III.14). **This real-sized labour is useful to work as a team by measuring, calculating, and developing the skills of turning a design on paper into a reality in the edible garden.**



Figure III.14.- Designing on the ground with coffee grinds

The recommended measurement for the paths is 50 cm wide, and for the beds 1,10 m, although, ideally we would adjust it to the smallest person or with less elasticity of the group so that he can easily reach, by bending down or crouching, the center of the bed without stepping on the cultivated area. It is necessary to emphasize the **importance**

**of avoiding stepping on the beds to prevent the soil from becoming compacted.** From now on we will only step on the paths.

After outlining the design we have to mark the limit between the paths and the beds, using whatever is around us, such as stones, used bottles, wood, etc., collecting and placing it over the outline of the design in order to leave on the ground a permanent drawing of our edible garden.

**At this point we can stimulate the imagination of the participants, and attempt to reuse the available material as much as possible by integrating it artistically and aesthetically in our edible garden (Figure III.15).**



Figure III.15.-The aesthetics of our edible gardens

If we use reused glass bottles, we have to remember to place them as close to each other as possible to avoid them from falling or moving; and to attach them we could use a peg to drill a hole in the ground where we can insert the neck of the bottle (Figure III.16).



Figure III.16.- Different shapes of the limits between the paths and allotments

If we use stones they should be as close to each other as possible for the same reason as the bottles, placing on the ground the side that settles the best, and avoiding sharp edges sticking out on the path so we won't have problems when pushing a wheelbarrow, or to prevent someone from tripping over (Figure III.17).

If we chose to use a log or a wooden board for the round beds, we would have to shape one of the ends into a peg so we can pin it down into ground on the outline of the design. If the beds were straight we could put down longer logs throughout the bed, pinning them down with small pegs at both ends.



Figure III.17.- "Learning by doing" mandalas

If we disposed of organic matter with a different colour than the beds, we could spread out a thin layer over the existing mulch of the path to give it a more appealing look (Figure III.18).



Figure III.18.- Coloured paths using different vegetable mulchings

The materials we use as borders create an interesting effect of heat adsorption, creating microclimates in our edible garden and shelters for beneficial insects and other living organisms for the soil and our crops, which also give us the possibility to observe a section of the life in the garden using tools such as magnifying glasses directly in the garden or by taking sections of soil to our classrooms where we can analyse the life in the edible garden with regular or binocular microscopes. **With this activity we can develop a therapeutic, instructive and fun exercise with the participants and we can discover with our own eyes THAT WE ARE NOT THE ONLY ONES THAT WORK IN THE EDIBLE GARDEN!** (Figure III.19).





Figure III.19.- We are not the only ones working in the edible garden!

If some areas of the design of the beds turn out too wide and we can't reach some areas from the corridor, we could place tiles in a strategic way to solve the problem; always taking into account the shortest or less flexible person so we can step on the tiles to access the cultivation area without stepping on the soil.

Or in case there is only a small piece of land available and in order to make the most out of it, the paths could be substituted for tiles, which could work as steps, placed in the cultivation area, making it possible to plant crops between them (Figure III.20).

**In both cases, this system could help the participants to develop important skills such as concentration and balance.**



Figure III.20.- A tile path in the cultivation area

We could also design raised beds/allotments to protect the crops from excess water in areas where there are floods. In areas with little but intense rain, it would help to guide the water between the beds, slowing the water down, filtering and helping to

avoid erosion of the soil. These raised beds would be built by digging out the soil from the paths and pouring it onto the beds until they reach the desired height. Straightaway we will provide at least 15-20 cm of compost just on the bed, not on the paths. The same method of placing newspapers/cardboards with mulching on the allotments and paths applies as previously explained (Figure III.21). It would be planted the way we will later explain.



Figure III.21.-Building raised bed allotments

### III.3 Irrigation systems we can use

The ideal irrigation system for this permaculture edible garden based on natural ecosystems is the sprinkler irrigation system because it resembles most to rain, wetting the whole surface, including beds and paths. This system humidifies the garden in a uniform way, which facilitates the decomposition of the organic matter and helps creating a rich soil life. This way, whilst irrigating the beds, the paths are also wetted. About a year later, we can harvest good quality compost from these paths. This compost will be used as substrate in the greenhouse or as extra nutrients for our beds.

It is also possible to combine the sprinkler irrigation system with the drip irrigation system in order to manage the water use in places where it is scarce; or only use the drip irrigation system if the situation required it (Figure III.22). In our case, these facilities will be placed over the design of our edible garden. The irrigation will end up on top of our mulching so that we can see it in case of breaking. We can easily fix it this way, avoiding breaking the hoses or cutting them by mistake.

**The installation of the chosen irrigation system can be an opportunity to start an instructive workshop for the people that benefit from this project.**



Figure III.22.-Irrigation systems: spray (left), drip (centre), combined (right)

### III.4.- Our first planting

The day after designing our allotments, we can already start planting for the first time. In any case, before starting to plant, it is a good idea to water the seedlings trays we will use and to wet the beds with a hose or sprinklers. This way the organic matter will settle better and it will be easier to dig the holes to plant (Figure III.23).



Figure III.23.- Watering the beds to make the organic matter settle before planting

At the time of planting it is necessary to move the organic matter a bit aside with our hands or carefully creating small circles with a dibble in order to avoid organic matter from falling into the hole we will make. The organic matter has to be moved away until the underlying paper is visible. If the organic matter falls into the hole it is harder to insert the seedling into the hole and later on it could also provoke decomposition, which would hinder the plant to take root and grow. With a dibble, we will make the hole so we can perforate the newspaper or cardboard, hence the importance of wetting them to make the perforation easier (Figure III.24). In case we chose to use cardboard instead of newspaper, we would have to wait long enough for it to soften down so we can perforate it more easily.



Figure III.24.-Planting for the first time the designed beds

The size of the hole will be slightly wider and deeper than the size of the rootball of the seedling so that when we drop it gently **and without squeezing**, it fits perfectly into the hole, on the same level as the compost, just below the newspaper. Once the seedling is planted, it is important to put the organic matter back into place: covering up again the part of the newspaper we uncovered before, making sure, however, not to cover the sprout of the seedling so it doesn't rot.

On the other hand, if we were to squeeze the rootball, we would make it very difficult for the roots to expand and for the plant to develop. The natural development of the plant would also be hindered if the rootball is left too high above the newspaper because in this case, the upper part of the roots will not be able to take root in the compost (Figure III.25).



Figure III.25.- Right suggested way of planting (left), wrong one (centre) and planting evolution (right)

When we finish planting, we need to water the seedlings so they take root quickly. Watering them two or three days in a row with a small amount of water will help them to settle down. Afterwards, **we can check the humidity of the soil** and water when necessary.

We will discuss the technique of direct sowing in the beds in the Didactic Unit V, "Maintaining our edible garden".

For a better harvest, space management and to make the most out of the sunlight, the most frequently used design for the plant distribution in our edible garden is a pyramid shape, which consists of placing the highest plants in the centre of the bed and the smallest plants on the sides (Figure III.26).



Figure III.26.- Pyramidal distribution of the plants

**For this activity, our participants can use their imagination in order to create rainbow coloured arrangements with the plants in the beds. This way, they develop their “edible creativity” (Figure III.27).**





Figure III.27.- “Edible creativity”

### III.5.- To summarize

In this didactic unit we desired to explain how important soil cultivation as a living creature is in Permaculture. In the previous didactic unit we emphasized as well the importance of the cultivation of water.

Let's not forget that according to José Graziano da Silva, FAO Director-General, “the soils host at least one quarter of the world’s biodiversity. They are key in the carbon cycle. They help us to mitigate and adapt to climate change. They play a role in water management and improving resilience to floods and droughts”, as stated in the declaration of the International Year of Soils by the UN in 2015.

But cultivating the soil is much more than this. It is also an opportunity to obtain nutrients for food, and an opportunity to reconnect as human beings to the nature we are part of, and the beauty through the magic of our senses: touch, smell, observe...In a nutshell: A GREAT OPPORTUNITY TO HEAL (Figure III.28).





Figure III.28.- Cultivating and feeling the soil

## Didactic Unit IV.- EDIBLE GARDEN FORESTS



### IV.1 A brief introduction to edible forests

Edible forests are an extra extension of an edible garden. They are perfect spaces for therapy and contemplation; cultivated ecosystems that create healthy and safe environments; they feed us; they preserve the soil, the nutrients and the biodiversity; and they also act as carbon sinks. They are based and designed through the observation and inspiration of natural forests, with the purpose of obtaining food, restore derelict areas or areas that are at risk of desertification.

Edible forests are formed by fruit trees such as avocado trees, orange trees, cherry trees, apple trees, etc., fruit shrubs such as Barbados cherries, raspberries, cranberries, etc., and smaller plants that grow fruit such as Cape gooseberries (*physalis peruviana*), strawberries or pepino dulce (melon pear) etc. There are also trees that provide us with wood, that fix atmospheric nitrogen and that harbour animals and biomass. This setting creates microclimates thanks to the different heights and the variety of species that fit into the edible forest.

These forests form a complex but highly efficient system; they constantly maintain a state of perfect natural harmony since their design was based on nature's patterns.

If we have enough land available, we develop the edible forests as an extension to the edible gardens. They provide an extra source of various fruits we can sell.

#### **IV.2 Our approach to the edible forest: designing the garden forest**

This section of the didactic unit depicts a different model developed in our project that we have named **edible garden forest**.

We have conceived, designed and initiated the edible garden forest model in our small plantation since we wanted to add fruit trees to our plots that at first sight seem more appropriate for an edible garden due to their size (Figure IV.1).



Figure IV.1.- Snapshots of an edible garden forest in summer in El Mato Tinto farm

This model manages space and productivity in the most efficient way, whilst being very therapeutic for every person involved in the project, creating a harmonic environment, which sets an example for a visiting area. In a few years we will be able to see its full therapeutic potential (Figure IV.2).



Figure IV.2.- Transformation of an edible garden forest in one of the plots of El Mato Tinto farm. In the image on the left, taken in May 2011, we can see several parts of the plot: the beds with their mature compost and the soil's skin (cf. Didactic Unit V) that covers them, the recently built pollinator volcano, and recently planted evergreen and deciduous fruit trees. The image on the right shows the same plot three and a half years later, in November 2014.

This model derives from the combination of the edible forest and the edible garden, **designed** together. In order to allow the highest amount of sunlight to enter in winter, the garden forest should have the shape of the letter U or of a semicircle with the open side, free of evergreen trees, targeted towards the sun.

It is a garden forest where evergreen and deciduous fruit trees, bushes, aromatic plants, flowers and vegetables are mixed up together (Figure IV.3).



Figure IV.3.-Image taken from the sunny side of the garden forest showing clearly the mixed design of a forest and a garden

In order to choose the correct crops and trees, we consider information of the area, climatology and orientation we explained in the Didactic Unit II “Designing the place”.

The evergreen grove from the U or semicircle shaped edible garden forest is formed by two parallel lines of trees: an outer line of hedges, as the one described in the paragraph “Hedges as borders for the ecosystems” of the Didactic Unit II , formed if possible by indigenous evergreen trees and bushes, with a space between them of one meter or a meter and a half, that provide us with fruit, wood, biomass, that fix nitrogen, produce melliferous flowers and create microclimates; and an inner line with deciduous fruit trees, planted at a distance of 3 meters or more from the outer line of hedges, depending on the size of the tree tops.

The evergreen fruit trees are planted at a distance of 3 to 4 meters between each fruit tree. This way, they function as the border of the garden forest the same way the hedges do, forming a living barrier that slows down the wind and humidity and what's more, the fruit trees restore and conserve biomass, improve the soil and produce food. In our case, once the evergreen laurel forest from the hedges has experienced wind and humidity it becomes stronger, which allows the increase of the capacity for biomass, of fauna, and creates an environment that favours biodiversity in the property.

It is recommended for the outer hedge to be lower than the evergreen fruit trees with the purpose of making it easier for the wind to rise up, and therefore affect less the garden forest.

As we indicated in the Didactic Unit “Designing the place”, this evergreen grove area is ideal for incorporating biotopes. And, if we have the possibility, this is also a great settingto build a pollinator volcano by integrating it into the environment.

#### **IV.3 Fruit, vegetables, aromatic herbs and flowers in the garden forest**

The remaining surface of the plot would be used for deciduous fruit trees, fruit bushes, small plants, edible and aromatic flowers and vegetables for eating and selling.

We would plant the deciduous fruit trees using the triangle pattern technique, at a minimum distance of two or three meters from the inside of the U or semicircle shaped evergreen fruit trees (Figure IV.4).



Figure IV.4.- Image showing the edible garden forest at winter. At the left, the back and the rightside of the picture we can see hedges and evergreen fruit trees that are still small, and in the center, different deciduous fruit trees planted using the triangle pattern technique next to vegetables and edible flowers of all sizes

When it is time to decide the number of deciduous fruit trees we want to plant in the garden forest, it is important to take into account the characteristics and location of the domain: surface, hidden places, strong winds, the presence of mountains, the exposure to the sun, etc.

If the plot is very exposed to the sun we would plant more deciduous fruit trees than in the case of little exposure. If the property receives a lot of sunlight it is recommended to plant the trees using the triangle pattern technique with a space between each fruit tree of 4 to 5 meters, but if it receives little sunlight the space between the trees would be of 6 to 7 meters (Figure IV.5).



Figure IV.5.- Spreading of deciduous fruit trees in the garden forest

In case the plot is located in a way it needs as much sunlight as possible we can also choose not to plant any deciduous fruit trees. If this were the case, it would rather be called an edible garden instead of an edible garden forest.

We would plant as many different varieties of evergreen and deciduous fruit trees as possible **according to our area**, and at least two trees of each variety to ensure fruit diversity in the different seasons of the year and to guarantee pollination of the varieties that need it (Figure IV.6).



Figure IV.6.- Edible garden forest in spring

The strategy of the different distribution of the deciduous fruit trees compared to the evergreen fruit trees has the purpose of allowing the right amount of sunlight to reach the plants in every season. In autumn and winter, the inner part of the area with the deciduous trees and vegetables is exposed to all the sunlight and is also benefiting from the leaves that fall from the trees, restoring the soil's skin with them (Figure IV.7).



Figure IV.7.- Collage of pictures taken in winter of vegetables, aromatic herbs and edible flowers planted around the trunks of the deciduous fruit trees

From spring to summer the deciduous fruit trees are full of leaves and fruit, which block the sunlight from reaching the ground under the trees, and therefore, some vegetables that need less hours of sunlight do not receive too much of it in midsummer. This avoids an early flowering of the vegetables due to the balance of sun and shade provided by the deciduous fruit trees at this time of year (Figure IV.8).



Figure IV.8.- Vegetables and edible flowers in summer under the deciduous fruit trees

On the other hand, the evergreen fruit trees do not cause shade inside the vegetable area at any season of the year since they are not planted in the sunny area of the garden forest, yet they do constantly provide biomass and fruit during their season (Figure IV.9).

Even if the pruning of fruit trees in edible forests usually is reduced to a minimum, the pruning in our edible garden forest largely consists of maintenance cuts: we prune the low offshoots and suckers so the area under the fruit tree stays accessible and open. In general, intensive pruning isn't necessary. We can also choose not to prune. In our case we found out this works best for us. In any case, if you're not experienced in pruning, it is advisable to follow a pruning course or workshop.



Figure IV.9.- Edible garden forest at the end of summer with 3-year-old fruit trees, evergreen ones at the sides and deciduous ones in the middle. At the left side of the image the pollinator volcano is **mimicked** into the edible garden forest. The people are at the sunny side of the garden forest, free of evergreen trees

In areas where it is not possible to plant evergreen fruit trees due to the climate, we still have to plant indigenous evergreen trees that we can find in the wild nature, even though they do not grow fruits. They serve as hedges that protect the deciduous trees and vegetables of the inner part of the garden forest from wind and humidity.

We will design the remaining space under and between the deciduous fruit trees the way we explained in the section “Drawing our allotments” from the Didactic Unit III “Designing our edible garden”. **We will involve the students in this activity so that they create a design in which they can draw and create round shaped paths and beds that form mandalas in which we plant and sow a variety of vegetables and crops between the fruit trees** (Figure V.10).



Figure IV.10.- Picture of the design of the edible garden forest a few months after its creation

The irrigation systems, the design we chose and the maintenance tasks of the remaining space under and between the deciduous fruit trees are the same as in an edible garden (Figure IV.11).



Figure IV.11.- Sprinkler irrigation system in the edible garden forest

This garden forest model ensures us that the biobox that we create for selling can be filled with a big range of different vegetables and fruits that all result from a therapeutic and pleasant visiting area (Figure IV.12).



Figure IV.12.- Visiting the edible garden forest, where you can observe the fruit of some 5-year-old deciduous fruit trees planted in the plot. The people are in the sunny side of the garden forest, free of evergreen trees

#### IV.4 To summarize

Human beings have been able to destroy large areas of ecosystems and natural forests in order to create a production model based on monoculture, believing that we could end world hunger. This model has caused a great loss of plant and animal biodiversity, more poverty and has not solved the problem of world hunger.

**Knowing that we are also able to change this situation by rehabilitating and restoring the soil with the purpose of regenerating biodiversity, whilst at the same time also producing healthy food in a local environment, gives us hope.**

Finding natural sources, the pillars that support life such as soil and water may be the way of achieving the welfare and covering the basic needs of human beings, animals and plants. The charm of having a simple life might be the combination of ingenuity, survival instinct, and listening, observing and breathing what the natural environment has to tell us (Figure IV.13).





Figure IV.13.- Collage of images of the therapeutic potential of the edible garden forest in different seasons of the year

## Didactic unit V.- MAINTAINING OUR EDIBLE GARDEN



### V.1 The soil's skin

In previous didactic units we have explained how to design the place (Didactic Unit II), and how to prepare the land from scratch to create our edible garden and edible garden forest (Didactic Units III and IV). Now it is time to deal with their **maintenance**, an essential part in this permanent polyculture system.

The level of mulching used for the **nutrition we applied to the soil** plays a crucial role in our edible garden's maintenance. We will identify this issue with concepts such as **soil's skin** and **surface compost**.

In this didactic unit we will see how and when to feed our soil by reusing organic resources from the spot itself, from the near environment and even from the homes of the people that benefit from the project, people that might be interacting with the neighbourhood by recollecting, for example, used coffee grounds, newspapers or cardboard from bars and restaurants, as we already discussed in the "wastes-resources network connected to the neighbourhood" section from the Didactic Unit II. **This activity can be done in pairs or in small groups depending on the difficulties the participants face. This task favours socializing, self-confidence and self-assurance, team spirit, mutual assistance...**

The approximate one-year experience of trial and error after starting ours edible garden and garden forest provides numerous opportunities to notice the need for change, especially taking into account the benefits of the people we work with.

By observing the soil, we can see that the mulch and the newspaper or cardboard used at the beginning have decomposed and therefore we can start to notice the dark tone of the soil and possibly rests of newspaper (Figure V.1). When the soil loses some of its cover, which is its protection, it loses humidity and life, turning into a dry, cracked and hard soil. It is better to avoid reaching this situation even though it is possible to reverse if we cover it with organic matter and we water it regularly the following days.



Figure V.1.- Images where the dark colour of the soil due to lack of organic matter is seen (soil skin)

When we start to notice small, bared areas in the mulch, this is the moment when the soil is hinting us that we need to cover it up again. This is the moment we need to restore the soil's skin with some type of organic matter that functions as a cover. We need to keep in mind that this polyculture system is based on nature patterns, since soil is not plough here. Its self-feedback is based on the closing of the cycle with the fall of leaves that forms the biomass that covers the soil, creating then perfect life conditions. After the biomass decomposition, the soil is fluffy and nourished. This is the pattern we are going to explain in this Didactic Unit to help maintain our edible gardens.

When available, we first add a **thin layer** of used coffee grounds, with an approximate thickness of 1 to 2 centimetres (maximum) with the aim of covering the complete surface between the plants that we still have in the edible garden, so it is not necessary to pause the cultivating area in order to feed it. This task must be done with caution to avoid dropping used coffee grounds onto the plants (Figure V.2). It is not necessary to remove remaining newspapers or cardboards, since after that they will remain covered and become compost components.



Figure V.2.- Spreading the layer of used coffee grounds with caution

Since used coffee grounds are an organic residue, they act as **nutrients that favour the recovery of humidity of the soil in case we've lost it, its sponginess and its appeal to decomposers**, such as the earthworm, and the rest of the impressive variety of fauna that exists in a soil like the one we propose, which are important allies that function as a multipurpose tool: they aerate, loosen and fertilize the soil.

After covering the soil with used coffee grounds we have the great opportunity to directly sow in situ, using the broadcast seeding technique. This method consists of spreading the seeds by hand over the used coffee grounds, trying to avoid getting them too close to each other, although if this happened they could be removed afterwards when the seeds sprout and they have grown enough to thin them.

**The participants can use a glass jar to carry a mixture of seeds of their own choice to spread them, such as Swiss chard, green beans that fix nitrogen, edible flowers, melliferous plants like marigolds or tagetes, arugula, radishes, sunflowers, etc. (Figure V.3).**



Figure V.3.- Seed mix spread over the used coffee grounds

After the broadcast seeding, we need to cover the soil with the organic matter we have available, carrying it with buckets. We will cautiously spread the organic matter around the vegetables, trying to avoid dropping it on top of the plants. To do so, we protect the plant with one hand while the other hand spreads the organic matter over the seeds and the used coffee grounds until the whole area is covered (Figure V.4). We need to remember that water hoses are to be left on top of the mulching, as we already saw on the Didactic Unit III.



Figure V.4.- Covering the seeds and the used coffee grounds with organic matter in the cultivated area

The layer of organic matter we need to place on the soil is of approximately 5 centimetres, meaning two or three fingers tall. We need to bear in mind that after wetting the organic matter its thickness will be halved, making it easier to plant (Figure V.5).



Figure V.5.- Images of the thickness of the organic matter (5 cm approximately)

**The sprouting and growth of the seeds is always a pleasant moment for the people who have participated in the activity. Now they can observe the edible creativity in which they have been involved (Figure V.6).**



Figure V.6.- Images of sprouting seeds and of the appropriate moment to thin the seedlings after having spread the organic matter

**With this first maintenance of the soil's skin, there should be no need of putting newspapers or cardboards again before applying the organic matter. The only case, in which we would apply newspaper or cardboard again, would be when we notice a lot of adventitious plants hard to remove in the cultivating area. We would be forced to stop the crop of the affected area and control them with newspaper or cardboard, as it was explained in the Didactic Unit III.**

As we explained, if we have to apply newspapers again, we would have to stop the plot completely or partially, and by not doing so, it would take us more work to weed these plants since they would grow again after a week (Figure V.7).



Figure V.7.- Replacing newspapers and cardboard by stopping the cultivation in one area of the edible garden

If we have large plants in the plot that we want to keep, or aromatic plants that we do not want to lose, then the newspapers must be assembled around the plants, as it was explained in the Didactic Unit III, "Designing our edible garden".

To avoid having to stop the production of the bed, it is crucial to control the adventitious plants from the beginning by pulling them out in order to weaken them and to prevent photosynthesis so they don't expand excessively.

During maintenance, it is important for the cultivated area and the paths to be covered with mulch at all times: whether organic material from the farm itself (biomass from the trees, hay, vegetable waste, surplus from the biotopes, etc.), or resources that we obtain from the wastes-resources network that we have created (garden pruning waste, woodchip, etc.) (Figure V.8).



Figure V.8.- Biomass from the farm (left picture) and from external collaborators (right picture)

This cover is the **soil's skin**, a cover that allows the soil to be fed by means of **surface decomposition** with the help of all the animals that live in the fertile soil, whilst maintaining its humidity at the same time and increasing the soil life because it protects from possible solar irradiation, frost and snow (Figure V.9). If possible, it's advisable to rotate the type of mulch, for example, applying hay the first time and pruning waste the next time, since the nutrients from each type of mulch are different.



Figure V.9.- Cultivating areas and paths covered with the soil's skin

If we are using organic waste from our exterior collaborators, we have to be aware of the presence of possible seeds, cuttings or bulbs of adventitious plants in the material since we do not know what type of plants are in the waste. In any case, after having covered the soil with the organic matter, it's easy to revise in group the allotments **at least once every two weeks**, pulling out sprouts that are not vegetables or crops (Figure V.10). **This activity offers a great opportunity to the people we work with since they develop their ability to observe and their memory, so they can learn to identify sprouts of adventitious plants hard to remove.**



Figure V.10.- Images of cuttings and bulbs of adventitious plants hard to remove

This technique of feeding and protecting the soil is applied once or twice a year depending on the climate area where we are, on the intensity of the cultivation, the

quantity of organic matter we add and the quickness of its decomposition, the irrigation system we use, etc. If we do not have used coffee ground, we can use substrate obtained from the cultivation of the paths, which we will discuss later, or as the last choice, we only add mulch.

In those areas with huge climate contrasts we have to cover the crop space with a generous mulch (of about 10-15 cm) before winter starts. That way, we will be protecting it from frost and snow. If we have vegetables capable of resisting these conditions, we will let them out of the mulch. This way, when spring comes, the soil will be ready to host new plants. The same happens when it comes to strong summers, where we will protect the soil from possible solar irradiation with the mulch, maintaining the soil's humidity.

## V.2 Planting vegetables

An optimal nutrition and protection of the soil creates the best conditions for a dense and a wide range of vegetables in the allotments. We can see and notice that the soil in our beds is spongy, which allows us to make holes to plant very easily. When we plant, we have to make sure we don't drop any organic matter into the holes, just like we explained when planting for the first time with the newspapers and cardboard. We do so by cautiously removing a bit of the organic matter before making the hole.

We drop the seedling into the holes **without pushing it**. If we are planting carrots, radishes, or plants with similar delicate roots that require more caution when transplanting them, we dig a hole twice as large as the cone of the seedling, or even a little deeper.

To attach the vegetable seedling and prevent it from dropping into the hole, we attach its upper part with our fingers by gently applying a light pressure without pinching it (Figure V.11). By doing so, we make it easier for the vegetables to grow straight since they have free space available underneath the roots of the seedling.



Figure V.11.- Planting carrots

In order to keep the edible gardens and garden forests constantly productive and with a high density of vegetation we use the **hole planting** technique, which consists of filling out all the spaces that have been created after harvesting the vegetables. In these spaces, we plant new seedlings without worrying if they are from the same variety that we have just harvested.

We do not use the crop rotation technique in this cultivation system since we have a permanent healthy soil that's being cultivated with the previously explained surface composting process, a soil with enough nutrients for all the plants. With this soil and the hole planting technique we ensure replacement and succession of the vegetables.

Even if we have a huge variety of vegetables, when we plant the same type of vegetable we must take the planting distance into account, which is the space we need to leave between the plants. In this case we use the triangle pattern technique, which consists in planting the same type of vegetables in a triangle. We do not have to consider the planting distance when planting different types of vegetables, it will depend on the type of vegetable. Lettuce, for example, will not be separated as much as broccoli, since the broccoli is bigger once the plant is considered an adult.

For instance, when planting carrots we do it with a planting distance of 20 centimetres approximately one hand span (Figure V.12, left). If the carrot seedling were to be next to a kohlrabi and the planting distance is 10 centimetres, the carrot will not obstruct the growing of any of them because the carrot is a tuber that grows downwards, and the kohlrabi grows sideward and upwards (Figure V.12, right).



Figure V.12.- Holes between the kohlrabi, made to plant carrots (left) and distance between the carrot hole and the kohlrabi (right)

By combining the hole planting and the triangle pattern techniques we manage the cultivating space more efficiently since it allows us to plant as many vegetables as possible, and therefore to take maximum advantage of the available space (Figure V.13). **This method allows the people we work with to put great effort into concentrating and caring through observation.**



Figure V.13.- Images showing the maximum yield of the cultivating area, the soil's skin isn't even visible

Since our edible gardens and garden forests are constantly producing, there will always be, simultaneously, spaces where the vegetables have just been harvested, vegetables that are ready to collect and others just halfway their growth. This way, we can maintain the succession harvesting of the vegetables.

In order to give a clear visualization of this succession, we use the cultivation and harvesting of lettuce as an example: we plant the lettuce next to the one that is about to be collected so that after we cut the lettuce, the new one has space to grow (Figure V.14). We continue doing this with the lettuce and with any other vegetable.



Figure V.14.- Images of the succession of the lettuce

Some plants, such as lettuce, kohlrabi or Florence fennel, must be cut and not pulled out, so their roots can be left in the soil and form part of the decomposition process.

Due to our experience we know that we can combine up to 20 or more different species of vegetables in one bed without having to think about the combination of different crops since there is no competitiveness among them when there is good fertile soil.

Maintaining the allotments with this vegetable density ensures a continuous production and commercialization. It also attracts all possible life into the area, creating the perfect conditions to obtain a natural balance of plagues and predators that secure healthy vegetables, plants, bushes and fruit trees.

In case we detect an occasional small plague or disease in a vegetable or plant, we do not have to intervene because the existing balance of our edible garden does not allow the plague to expand from one plant to another (Figure V.15).

**It is better to observe than to act.** The information that we receive by observing the plants tells us that our seed is not good or that the soil might not be completely balanced in this spot and that we have to wait until it balances itself. And, if we needed to act, it would only be by giving more nutrients to the soil. On the other hand, if our problem is the presence of multiple snails and slugs (they love small plants such as cabbage), it probably means we either don't have enough biodiversity and/or there is excess moisture in the beds. A solution might be to add different new aromatic plants and vegetables.

On areas where rain is very frequent, or in places with high humidity, in the newly transplanted seedlings we can leave the mulch separated from their stems so as not to concentrate the moisture too much. We can also control the irrigation checking the soil's humidity with our own fingers. **We need to remember it is important for our edible garden's balance to attract as many predators as possible with one or two biotopes.**



Figure V.15.- Plants with a disease next to healthy ones

On the other hand, as we never plough the soil in this cultivating system, the layers of the soil aren't disturbed. This has the great advantage that every time less and less bad weeds germinate. It is true, however, that seeds brought in by birds could also sprout, but, as we discussed before, if we have a diverse and dense cultivation of vegetables in the beds, only a minimum amount of seeds will sprout due to the lack of light that reaches the soil (Figure V.16). These few weeds can be controlled by pulling them out and leaving them as mulch. This is a task everybody can do whilst planting, harvesting or just going for a walk.



Figure V.16.- Images of a diverse and dense cultivation

**This maintenance task is a perfect activity to involve the people from the project. It is an opportunity for them to learn how to identify the moment when the soil's skin needs to be restored and how it is fed by doing so.**

**To summarize, with this fundamental maintenance task, not only are we cultivating the soil, but we are also cultivating our observation and our attention whilst indulging and protecting our edible gardens and garden forests.**

### V.3 Visualizing the living soil

**The people involved in the project can take part in a playful activity; an interesting activity to understand how the cultivation and maintenance of the soil works, and with the purpose of emphasizing the relevance of these two processes of cultivation and maintenance, and of that of the protection and indulging of our edible garden and garden forest. The aim of this activity is for them to get to know the soil's layers and the functioning of a living soil in a visual way.**

The required materials for this activity are: a fish tank, reused if possible; small rocks (with an approximate size of two to three centimetres); soil; compost with earthworms; used coffee grounds; and some type of mulch.

**We involve the people of the project to participate in this activity so that they collect the materials that they are later going to spread out into layers in the fish tank:** a first layer of 5 to 8 centimetres formed by rocks that will function as drainage, as well as a representation of the rock layer of an area; a second 10-centimetre layer of soil; upon which we add a third layer of 15to 20 centimetres of humid compost with earthworms; on top of the compost we spread out a fourth 1-centimetre layer of used coffee grounds; and finally, we add a fifth surface layer of 5 to 8 centimetres with some type of mulch.

These are approximate measures; they should be calculated proportionally according to the height of the fish tank.

Once the fish tank has been filled out with the listed layers, we plant different varieties of seedlings such as lettuces, carrots or radishes, plants that do not get too big when they grow. We plant some of the seedlings next to the glass in order to see the roots grow. We also add some seeds next to the glass so we can observe how they sprout and see their roots through the glass.

We have to take into account that one of the conditions of a natural soil is total darkness, so we need to cover the glass of the fish tank with cardboard or some other material to make the glass opaque. However, the plants do need light, so we will place the fish tank in a bright spot. We will only remove the cardboard from the glass when we are doing an observation activity (Figure V.17).



Figure V.17.- Covered part of the fish tank to visualize the living soil

Making sure the roots of the seedlings can grow in the required conditions isn't the only reason why we cover up the fish tank: in order to do their job, the earthworms need darkness too. When we uncover the fish tank we can see them move through the tunnels they built, which are easier to see if the worms work next to the glass (Figure IV.18).



Figure V.18.- Fish tank used to observe how the living soil works

We water the fish tank slightly in order to maintain its humidity, while observing through the glass the infiltration process of the water through the different layers, controlling the quantity of water we add in order to avoid water logging. We will maintain the cultivated soil the same way as it was previously described in the section “The soil’s skin”.

As time goes by we can notice how the colours of the different layers tend to unify due to the movement of life that exists inside the fish tank. To check the movement we can make moveable identification labels for each layer, place them at one side of the fish tank and move them according evolution of the layers and the behaviour of the soil (Figure V.19).



Figure V.19.- Fish tank with identification labels for each layer

#### V.4 Cultivating paths of life

The paths are the roads that guide and connect us to the cultivating areas, while giving shape to our edible gardens and garden forests (Figure V.20). They are just as important as the beds that we cultivate. They provide us with nutrients (compost) for the seedling trays in the greenhouse and contribute to our beds, hence the importance of its cultivation.



Figure V.20.- Paths of life in the edible garden

The paths also function as ecological corridors between the beds, which mean that the soil's life does not stop at the paths, in the contrary: it continues and is completely homogenous throughout the entire design of the edible gardens and garden forests (Figure V.21). This is why we also use mulch to cover our paths, which decomposes and produces surface compost that is later transformed into mature compost. This is why our paths aren't just simple roads: they are authentic **paths of life**.



Figure V.21.- The paths in our edible gardens and garden forests as ecologic corridors

As the mulch of the paths is a vegetal cover, it functions as a sponge, which has the great advantage of absorbing the water when we are irrigating or, especially, in rainy seasons. This way it prevents puddles to be formed and us to get dirty with mud after watering the plants and therefore making it easier for us to sow, plant, harvest, etc. (Figure V.22).



Figure V.22.- Different types of mulch for the paths

**This type of mulch gives us the opportunity to make the people we work with discover the sensation and delight of walking on a spongy path when it is raining, and to simultaneously listen and feel the raindrops.** We carry out this activity with the appropriate attire, such as good quality boots and rain jackets, to protect us from the rain and cold.

After the first year, almost all the organic matter that we added onto the paths will have decomposed. Before covering it again we remove all the mature compost. If we notice there is still some coarse organic matter that has not yet decomposed, we rake this part and move it aside (Figure V.23).



Figure V.23.- Moving with a rake the compost of the path that has not decomposed

**One person could do this task alone, but we recommend doing it in pairs with the people we work with, since it promotes gender equality, team spirit, and working skills with tools such as the hoe and the shovel. With the help of the instructors, it's also a good opportunity to pay attention to correct postures and to concentrate on good and correct breathing.**

With the use of a hoe, a shovel, a wheelbarrow, and without too much effort, one person scrapes off the top layer of compost and makes small piles so the other person can shovel it up and fill the wheelbarrow, that once fully loaded, is carried to the greenhouse, where it can be stored to be used to fill the seedling trays, for the cuttings, to transplant,... (Figures V.24 and V.25). We have to keep on scraping until the brownish colour of the earth starts to appear, a colour that is different from the colour of the compost.



Figure V.24.- Extracting the substrate with the hoe



Figure V.25.- Substrate harvesting from the paths of life

Once the compost of the paths has been extracted, we use organic matter to cover the paths again, starting from one side and gradually covering the entire path.

An indicator of how much organic matter we should add on the paths is the height of the material we use as edges for the allotments, whether stones, logs,... This replenishment also provides us with other path functions: the fact of walking comfortably on them without getting muddy in case of heavy rain, and of ensuring the optimal conditions to generate a large quantity of surface compost on the paths.

The path is a permanent source of mature compost that's constantly generated with materials that we cannot use as organic matter in the beds. The renewal of the soil of the paths is done progressively when the path requires it, by adding organic matter just like we did in the beds. Depending on the type of organic matter we have added there is a difference in decomposition rates that varies from 6 months up to one year; the weather conditions of the area also have an influence on the duration of this process.

As we pointed out before, we use the coarsest or most ligneous organic matter we have available as mulch for the paths, organic matter we can easily step on. This material is not appropriate as mulch for the beds because of its coarseness and long decomposition period. By using this material on the paths, we don't hinder the cultivation of the crops in the beds.

Other ideal types of mulch for paths are the ones with a higher acidity or that take too long to decompose, such as pine needles, eucalyptus pruning, winery waste (grape pomace - seeds and stems), or other types of cover like the shells of some nuts, such as almonds, walnuts, olive pits, etc... (Figure V.26).



Figure V.26.- Renewing the paths of life with various materials

The substrate we have obtained from the paths can also be added directly onto the beds the same way as it was previously described for the used coffee grounds, with the small difference that now we can add more quantity (Figure V.27). In this case we directly fill buckets or wheelbarrows with the substrate in order to use it on the adjoining beds or where it is most needed.



Figure V.27.- Feeding the beds with the substrate from the paths

The way we cultivate our paths demonstrates the importance of the sprinkler irrigation system, that is the most similar to rain, as explained in the Didactic Unit III. With this system, we do not only water the beds, but we also include the paths, ensuring a uniform humidity over the entire plot and creating ecological corridors. The sprinkler irrigation system is designed to water the entire plot, both the cultivating area and the paths (Figure V.28).



Figure V.28.- Watering the new edible garden with an irrigation system similar to rain

The drip irrigation system can be combined with the sprinkler system in case of water-use restriction in a certain season of the year, but we recommend always using the sprinkler irrigation system since it maintains a permanent decomposition in the entire

edible garden, a decomposition that produces nutrients in the beds from which we obtain produce, and in the paths from which we obtain good quality compost.

In order to know when to irrigate, we can touch the soil to check its humidity. In any case, it is important to take into account that the best time of the day to irrigate by sprinkling is in the morning or the evening in order to prevent the sun from burning the leaves of the plants. We can irrigate in the midmorning if the day is cloudy or if we use the drip irrigation system.

**The moment of extracting the substrate of the paths is an ideal time for the participants to show the visitors of the project the potential of an area that at first sight seems unproductive, so they can say to the visitors that they are walking on authentic paths of life (Figure V.29).**



Figure V.29.- Images showing the vitality of our paths of life in the edible gardens and garden forests

Cultivating the paths with the appropriate irrigation provides us with several functions: comfortable and accessible paths at all times, ecological corridors, substrate for our greenhouse, nutrients for the beds and therapy for the people we work with that can comfortably walk through the edible gardens and garden forests.

## V.5 To summarize

An optimal maintenance of the soil, including important elements such as the biotopes or the pollinator volcano, which we have discussed in Didactic Unit II, ensures biodiversity in our edible gardens and edible garden forests, ecosystems that are balanced by their own biodiversity: a biodiversity that gives shelter to many species of predators that help us to control plagues and where we cultivate healthy food and develop good mental health (Figure V.30).



Figure V.30.- Therapy by maintaining the edible garden and a sample of nutritional diversity

## Didactic Unit VI.- FROM THE SEED TO THE HARVEST



### VI.1 Seed selection criteria

In this didactic unit, we transmit the importance of having vegetal biodiversity in our edible gardens and garden forests with the purpose of **obtaining a cultivated ecosystem that is as similar to nature as possible**. We can obtain our seeds by using our own resources and thus closing the cycles. The seeds enable us to assure a proper nutritional diversity and the continuity of food for the next generations.

A good selection of our seeds occurs when we **interact with the surrounding seed networks**, networks that ensure us plant material that's appropriate for the area through traditional knowledge. This material comes from reliable sources and has been reproduced in an ecological or responsible way, and therefore assures a high germination rate.

All this allows us to collect high quality seeds from mother plants and maintain an offspring line that ensures the continuity of crops.

One criterion for selecting a mother plant is by looking at its morphological characteristics taking into account the evolution of its growth: a vigorous growth and healthy appearance, a good blossoming, a productive plant with fruit that has the same size and characteristics as the fruit from the original plant. These plants should be resistant to diseases and parasites and be regular in the germination process. On the plants that we want to obtain seeds we would have to leave as much of them as possible to flower, to guarantee a higher purity and a high percentage of seed production since some could be damaged.

We never choose a plant that tends to flower prematurely or the first adult plants that are going to bloom, that has overgrown, or that does not have the same appearance as the other plants (Figure VI.1).



Figure VI.1.- The plant we keep for its seeds is the one on the right so it can flower, whereas the one on the left, which hasn't formed the bud, we don't let it go to flower

The information sources we rely on when cultivating plants in order to obtain seeds are the traditional knowledge and the bibliography about the hybridization of certain plants.

To avoid hybridization of plants among species or varieties, we can isolate them in space, in time or with a handcrafted technique.

The spatial isolation of plants is used for the purpose of obtaining seeds from different plants, planting them with the maximum distance so that they don't hybridize. However, this is the least recommended technique when it comes to keeping the purity of our plants due to the high percentage of hybridization through insects and wind. If we want to succeed, we need a big area to protect the plants from other's pollen, or we could also use nets or thermal blankets.

With spatial isolation we prevent plants from flowering at the same time: for example, if we want to obtain two different types of corn seeds, we need to study its temporality and plant them at different times to prevent them from flowering at the same time and hybridizing.

It could also happen that some plants produce hybrid offspring in a natural way or because we did not notice we planted them too close to each other. For example, if we allow different types of radish, a red one and a black one, to flower in the same environment, their seeds could develop into the original radish or into a purple or black variety that has the characteristics of the red one or vice versa (Figure VI.2).



Figure VI.2.- Hybrid radishes

If we do not want this to happen, we need to rotate the different varieties throughout the year to maintain their purity, but from a hybrid offspring we can obtain a new variety that, if we maintain its morphologic characteristics during several generations, will end up transforming into a different local seed.

## VI.2 Time to collect our seeds

The process of maturation in order to collect seeds varies depending on the type of plant. Let's see some examples:

To guarantee the seeds of lettuce we choose several plants from the same variety according to the criteria previously discussed.

**With the help of the participants of the course we mark the plants with a stick, a rope or a handkerchief to know which ones not to cut since they have been picked out to go to seeds (Figure VI.3).**



Figure VI.3.- Marking lettuce and black radish plants for seeds with a stick and a rope

When the lettuce reaches its final growth stage, and the time for collection has passed it tends to bolt and to flower. We can see how the lettuce gets longer, its leaves get progressively smaller, they get separated from each other and they get dull. The lettuce loses its edible aspect and the central stem becomes uncovered (Figure VI.4).



Figure VI.4.- Transformation of different lettuces flowering

**This transformation is a great opportunity for students to observe the interesting evolution of this vegetable.**

In the next stage, the lettuce starts to branch from a third of its height and ends with an inflorescence formed by numerous yellow flowers, which dry out and give us seeds provided with a feathery pappus (Figure VI.5).



Figure VI.5.- Lettuces in bloom and with feathery pappus

The ideal time to collect the seeds is when the pappus covers between 20 and 30 % of the totality of the surface. At that moment we cut the lower part of the stem and we introduce it in a paper bag so it can completely dry in a dry and vented place.

**The moment of cutting the stem is a great opportunity for the users to check that if we pull one of the feathers from the pappus, we can see that the seeds are attached to each one of those feathers, and the curious and magical design that is useful to transport the seeds with the help of the wind or animals (Figure VI.6).**



Figure VI.6.- Image of a lettuce with pappus to collect the seeds from, and image showing the seeds and its pappus

Once the plant is dry we rub its flowers between our hands above a clean, dry and clear surface where the seeds will fall down (Figure VI.7). We then clean the seeds.



Figure VI.7.- Dried lettuce and rubbing them to obtain their seeds

The cleaning of the seeds can be done through handicrafts or even by intuition; we will practice this task with the students. Cleaning is an easy task that requires time,

dedication and patience, which the people who we work with can also develop (Figure VI.8).



Figure VI.8.- Cleaning Canary saffron seeds

Let's see some examples. We pass the seeds through sieves and strainers of different sizes until they are as clean as possible (Figure VI.9).



Figure VI.9.- Sieves and strainers to clean the seeds

If the seeds are still not clean after straining them, we can make small piles with them and gently blow in order to separate the seeds from the dry remains (Figure VI.10).



Figure VI.10.- Images of the cleaning of radish seeds

Once the seeds are clean we introduce them into recycled jars, preferably dark in order to conserve the seeds better. The jars can be collected from the neighbourhood by the users of the PERMIND course (Figure VI.11).

Each jar has to be labeled with relevant information about the seed (year, variety, place of collection...). The place we choose to store the jars must be cool, dry and dark; we can even store the jars in the lower part of a fridge in order to extend the life of the seeds.



Figure VI.11.- Labelled jars to conserve the seeds

In the case of the zucchini, from the *Cucurbitaceae* family, the ideal fruit to select to obtain the seeds from is between the 5<sup>th</sup> and 8<sup>th</sup> fruit from the plant we have identified according to the selection criteria we have previously discussed. After the 5<sup>th</sup> fruit, the plant is mature enough for us to recognize its positive characteristics.

Once we have chosen and marked the fruit with a stick, rope or a handkerchief, we leave it on the plant until it reaches an excessive size and changes color. When the plant finishes its cycle and completely dries out, we cut the fruit before winter so that the seeds can develop enough. We leave the selected fruit to ripen in a shaded and ventilated place (Figure VI.12). When we notice that the fruit starts spoiling we extract the seeds.



Figure VI.12.- Collecting a zucchini and drying some marrows to obtain seeds

In order to obtain and clean the seeds of our zucchini we need to open it in half, extract the seeds, wash them with a strainer and then dry them during several days (Figure VI.13). It is important to dry the seeds mainly on sunny days. After making sure they are completely dry we put them into the dark jars and label the jars.



Figure VI.13.- Images of the extraction, cleaning and drying of the seeds from the black seed squash (*Cucurbitaceae*)

To clean the type of seeds coming from onion, leek and garlic plants, we need to rub the flowers and then introduce the seeds into water to clean them well. We can see

how the good seeds sink, whereas the empty or bad ones float. We remove the bad, upper part and then spread out the good, sunken ones on a surface so that they dry quicker and we can easily stir them once in a while in order to let them dry (Figure VI.14).

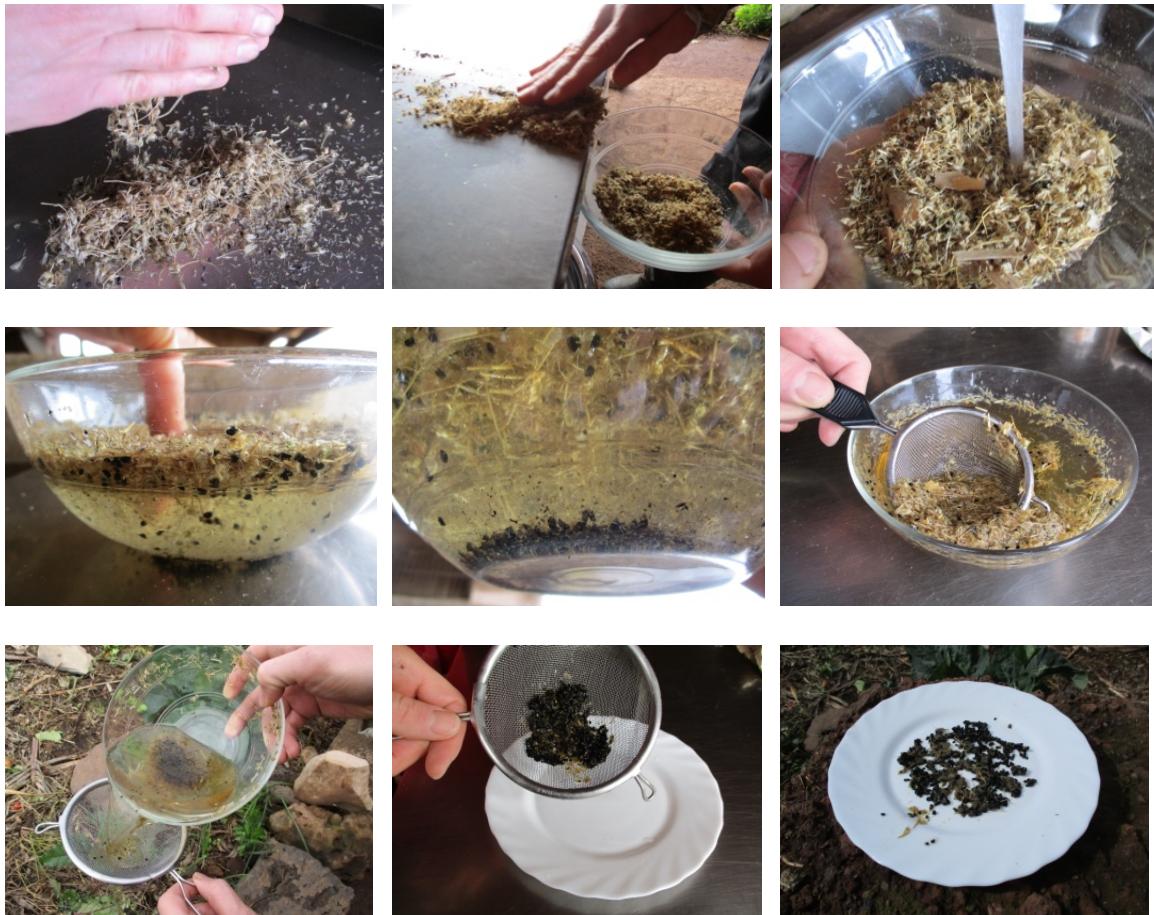


Figure VI.14.- Rubbing, selecting and drying onion seeds

The drying of the seeds must be done on very sunny days whilst watching out for the wind. We will never leave the seeds outside during the night since the dew would make them wet again. We will stir and dry the seeds during several days depending on the amount of sun. Once they are completely dry we will insert the seeds into jars and store them.

Good cultivation, selection, harvest and storage conditions guarantee an optimal germination of the seeds. The cleaning process is a great moment to detect their quality: ensuring that the seeds are filled. To examine this, we can press them slightly to make sure they aren't empty. Observing the seeds also helps us because empty seeds look different than filled ones.

**In places with strong winter conditions, we can carry out the whole seed process as a recreational activity with the students, inside the classrooms.**

We can check the vitality of a seed by doing a germination test that could also be a playful and instructive activity for the students. The test consists of putting a few seeds inside a glass of water. We leave the seeds submerged for 24 hours, and then we drain and place them on a plate covered with another plate so that they are in complete darkness for a few days and they take less time to germinate.

We wet the seeds once a day so they stay humid. By doing so we ensure that they keep growing and we can check the germination rate (Figure VI.15). The time seeds take to germinate is different depending on the type of seeds we put on the plate. For example, 2 to 4 days after having put radish seeds on a plate we can see how some of them already have sprouted.



Figure VI.15.- Different germination stages of black radish seeds

**The germination process is a unique opportunity for the participants of the course to reason and learn since it teaches them about photosynthesis: nature's quintessential productive process.**

We can teach about the effect that light has on plants by following the germination process: if we keep the sprouted seeds in darkness the stem and leaves will stay white, but if we let the light reach the seeds, without being directly exposed to the sunlight, we will notice how the stem and leaves turn green due to the process of photosynthesis (Figure VI.16).



Figure VI.16.- Images of the effect that lack of photosynthesis has on a potato after sprouting in darkness (an upside down pot)

### VI.3 Sowing in our greenhouse

We recommend having some type of greenhouse in the property in order to sow a variety of seeds that ensures the replenishment of vegetables. This allows us to manage the succession of the cultivations that will later be transferred to the soil.

Sowing in a greenhouse requires a high quality substrate so that the seedlings are nourished enough in order to grow until being transplanted. In the previous didactic unit we explained how and where to obtain substrate for our seed trays: from the **compost of the paths of life**.

We need to sieve the substrate before using it on the seed trays. Two people will take part in this activity that requires a sieve, a shovel and two wheelbarrows, one filled with coarse substrate and an empty one for the smooth and spongy substrate.

We place the sieve on top of the empty wheelbarrow. We scoop up some substrate with the shovel and we pour it onto the sieve. Then, the two persons sieve the substrate over the empty wheelbarrow so that it is filled with the smooth and spongy substrate (Figure VI.17).



Figure VI.17.- Images of the process of sieving and obtaining smooth and spongy substrate for seeds

Every time we sieve, the substrate that has not finished decomposing yet stays on the sieve, this coarse material is put aside so it can be used again on the paths or beds and decompose completely. If we have some remaining compost, we can store it until we need to use it again.

**This activity offers a great therapeutic opportunity for the people we work with because it helps them to acquire motor skills such as the coordination when sieving with another person, a correct breathing and posture.**

We fill a bucket with sieved and spongy substrate. We pour its contents onto the seed trays without pressing them down. A way to avoid pressing the substrate into the slots is pouring it onto the center of the seed tray to create a pile. With a board or a similar object or even gently with the palm of the hand we can spread the substrate into the empty slots and remove the excess to even out the surface (Figure VI.18). By using this technique we create small air pockets inside the slots that contribute to a better rooting of the seedlings.



Figure VI.18.- Filling the seed trays with substrate

We need to take into account that we are not working with peat so its conditions are not the same as the ones of substrate. For example, if we let our substrate dry completely, it will harden and then it will be more difficult to make it humid again. We can recover the substrate if we water it more frequently with less water. With our substrate, we only need to bear in mind that we should not press it down and that before filling the seedlings have some moisture without soaking it.

In the case of commercialized peat, since it is more porous than our substrate, it functions as a sponge because it has more air pockets in its interior making it easier to recover the humidity of the seed tray.

The trays sown with our substrate might grow some weeds that are easy to remove with the help of the students. **This task encourages users to learn to distinguish between seedlings from weeds and seedlings from vegetables.**

Depending on the plants that we sow, the first leaves of the seedling have a specific shape that we will recognize better each time. For example, the first two leaves from the cabbage have the shape of a heart, whereas the first two leaves of the lettuce have a round shape.

After filling the tray we will make holes by gently pressing the substrate with our fingertips (Figure VI.19).



Figure VI. 19.- Making holes in the tray to sow seeds

We gently drop one seed into each hole. We recommend making all the holes before starting to put the seeds into them to avoid possible mistakes. By doing so, we can visually keep track of the sowing (Figure VI.20). If more than one seed falls into a hole, it is preferable to let the seeds sprout since trying to take them out could cause worse consequences.

We then cover the seeds with the help of a finger in order to control the amount of substrate we add. The layer of substrate we cover the seeds with should be as thick as the size of the seeds.

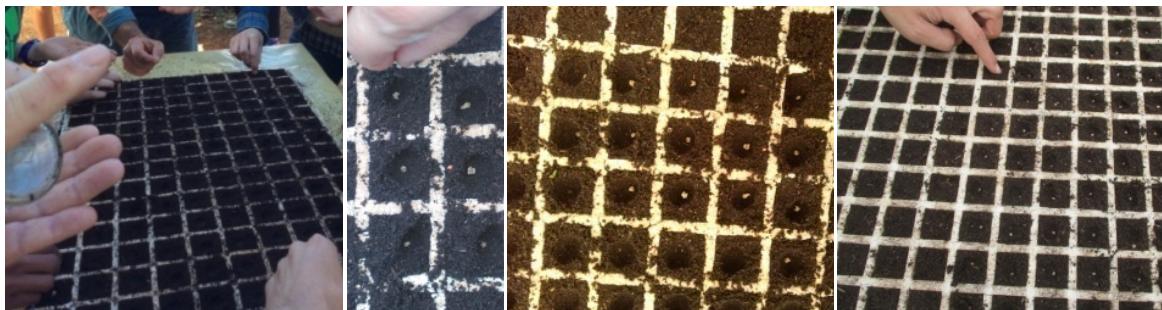


Figure VI.20.- Dropping seeds into the holes and trays with covered seeds

**This sowing task is very therapeutic for the people who we work with because they need to concentrate in the said task; they keep their mind in the present moment, they improve their patience, they develop skills for accurate and specific tasks and we can see the relationship that each person has with certain seeds.**

**We also provoke a sense of intrigue about the future sprouting of the seeds they have sown which increases their interest and desire to closely follow the evolution of the seeds.**

In order to be able to identify the seeds and to follow their growth we attach a little sign to the tray, indicating the name of the plant and the date the seeds were sown.

Once the seeds have been covered we will gently humidify the tray with a watering can or a sprayer, making sure not to uncover the seeds. We can check if the tray has been watered enough when we pick it up and notice its weight has increased. We will not water it again until the seeds start sprouting.

If we plant several trays simultaneously, once we have watered them we will place them on top of each other since seeds germinate quicker in darkness. We pile them up with caution, without dragging them in order to prevent seeds that might be near the surface from moving. We cover the last tray with a humid sack or something similar so the tray stays humid and to ensure that it remains in darkness (Figure VI.21).



Figure VI.21.- Spraying and piling up the newly sown trays

It is crucial to monitor the germination of the seeds on a daily basis by carefully lifting up one side of each tray in order to identify the moment when they have to be removed from the pile, because if the sprouted seeds spend too much time in darkness they will grow quickly in search of light. In this case, the seedlings put all their energy in growth, which weakens them and sometimes causes them to die.

The time it takes seeds to sprout depends on the variety of vegetable we are sowing: two days, four days, one week or even more (Figure VI.22).



Figure VI.22.- Evolution of the sprouting of lettuce seeds

The time needed before transplanting also depends on the type of seed we sow: it can range between fifteen days and two months approximately (Figure VI.23). It also depends on the climatology of the area, the nutrition of the seedling, the humidity and its season. We will learn all of this by trial and error, using the information we find in specialized manuals about seeds and sowing and with the lunar calendar of the current year.



Figure VI.23.- Trays with different seedlings ready to transplant

**The small inconveniences that our substrate has in relation to peat are offset by the advantages of its self-sufficiency by closing virtuous cycles, by reusing a waste in a quality resource in a local and responsible way, facing the problems of depletion, pollution, global warming... The peat bogs are the maximum carbon sinks and potential wildlife refuges that are destroyed by their drainage and extraction, when we support their consumption.**

#### VI.4 Time to transplant to the ground

When it's time to transplant the seedlings to the beds we first have to water the trays. We make sure that, when we pull them out, the seedlings come out easily and with their entire rootball (Figure VI.24).



Figure VI.24.- Extracting lettuce and carrot seedlings with the fingers

It could happen that some of them have turned out to be somewhat small even though they stayed long enough in the greenhouse to grow. In this case it is better to transplant them into the ground with the rest of the seedlings so they do not get weak.

In order to take out the seedlings from one side of the slots we can use a tool such as a dull knife, being extremely careful with plants such as carrots not to cut the taproot (Figure VI.25).



Figure VI.25.- Extracting the seedlings with a dull knife

We distribute the seedlings in the beds as it was described in the previous didactic unit (Figure VI.26).



Figure VI.26.- Seedlings in trays ready to be transplanted and planting them in the bed

We can also combine the transplant activity with a direct sowing technique different from broadcast sowing. While some people are transplanting the seedlings from the greenhouse, others can sow seeds in the beds placing them under the mulch at the same depth as if we were sowing them in trays (Figure VI.27).



Figure VI.27.- Direct sowing in the bed

With our fingertips, we first make a small hole where we drop the seed. We then cover it with our fingers so we can control the amount of matter we add on the seed. On the contrary to broadcast sowing, we drop the seeds deliberately at the desired distances so that afterwards we do not have to remove any plants.

A different way of sowing is making seedbeds directly in a section of a bed so we can later transplant the seedlings to other parts of our edible gardens or garden forests.

We also allow some vegetables to flower so that they produce seeds that self-seed in the beds, letting them drop their seeds onto the mulch just the way it **occurs in a natural ecosystem** (Figure VI.28).



Figure VI.28.- Images of vegetables flowering and self-seeding area

The time seedlings need to grow after they have been transplanted until we can harvest them also depends on the type of vegetable we have planted, the climatology, the area, etc.

In order to study and monitor the time a seed needs to develop into a fully-grown plant that's ready to harvest, we use a field notebook in the garden and the

greenhouse. We can either buy or make a personalized one with the students. With this we strengthen skills of the students, such as the constancy in the annotations in the field notebook every day, where grammar, mathematical calculations, creativity in drawing..., are also worked. (Figure VI.29).

In the notebook we describe how we organize ourselves so that we can use it to calculate how much time the seeds take to develop into seedlings in the greenhouse and the vegetables to be harvested once they have been transplanted in the beds.



Figure VI.29.- Our personalized field notebooks with notes and drawings

For instance, if a lettuce seed takes about three days to sprout, one month in the seed tray and a month and a half or two months in the soil before being collected, we know how many trays need to be planted every so often and throughout the season to ensure the succession of the lettuces in the greenhouse and in the beds, and therefore establish a continuity in harvesting and commercialization.

**Making and personalizing a homemade field notebook offers a perfect opportunity for an artistic and therapeutic workshop for the users of the course with the help of the instructors. The notebook not only functions as a guide for the organization of the activities of the greenhouse and the garden, but we can also show it to the people that visit our edible gardens.** We can leave spaces in the notebook to draw, to make diagrams or to insert pictures of events in the garden.

**The people that participate in the course enjoy and learn, watching the transformation that plants and their flowers undergo from the moment they are sown and sprout, growing flowers and fruits, until they wither and their seeds grow and ripen:** seeds that drop onto the soil and of which many will germinate spontaneously as part of the natural regeneration process. **This process creates a harmonic and therapeutic colorful place where we spend some time simply observing the beauty of our flowering plants or how they grow seeds.**

The various sowing methods we have described (broadcast sowing, sowing in seedbed, direct sowing...) are very useful if at some point the succession planting in our garden fails. The trial and error method also helps us to improve our know-how.

## VI.5 Cultivating biodiversity

When choosing which crops to plant, we recommend a great seedling variety according to a crop planning that takes climatology, the season of the year and the area into account. The articles that different research and agricultural extension centers of each area publish about crop planning are a good source of information to cultivate biodiversity in our edible gardens and garden forests, as well as the information from the farmers of our area and our own experience.

Cultivating biodiversity is the best way to guarantee the resilience of the project by securing our seeds and our harvest and by commercializing our vegetables, fruits, edible flowers and aromatic plants (Figure VI.30).

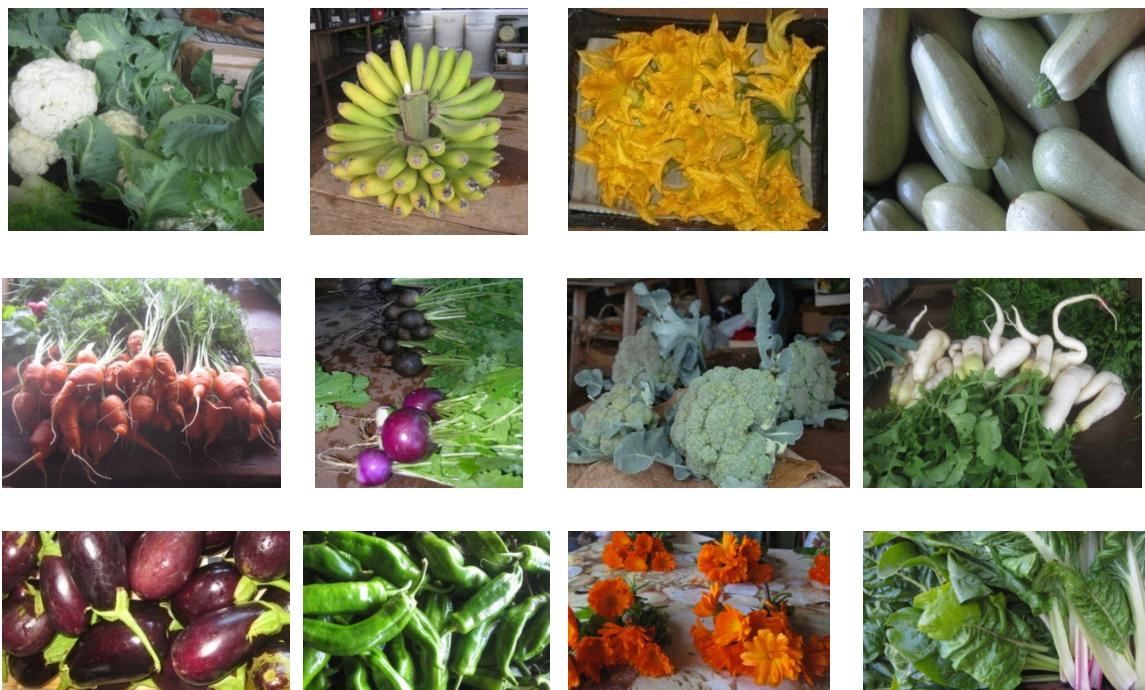


Figure VI.30.- Fruit, vegetables and edible flowers collage ready to be introduced into the bio-boxes in the vegetable market

In our one-hectare property we have a bit more than 3.000 m<sup>2</sup> of usable agricultural surface, where we cultivate over 300 varieties of useful plants (edible, aromatic, producing forage, melliferous and for mulch); we have a weekly production of thirty-five bio-boxes for our collaborators and a surplus that is distributed in eight market

stalls. We are talking about an average of six kilograms per bio-box and twenty-one products from different varieties (Figure VI.31).



Figure VI.31.- A sample of the top part of the bio-boxes

For instance, during spring and summer, we sell baskets filled with Swiss chard, basil, celery, eggplant, red beetroot, broccoli, marrow, zucchini, pumpkin, onion, coriander, cabbage, cauliflower, rutabaga, spinach, kohlrabi, beans, lettuce, turnip, parsley, green pepper, leek, malabar gourd, radish, little radish, arugula, tomato, carrot, etc. And of course we shouldn't forget the fruit from the fruit trees we talked about in the Didactic Unit IV that we can also commercialize.

In our gardens we also have vegetables that grow fast and that force us to rotate and succeed them quicker than others that can stay much longer in the garden, such as cauliflower, cabbage, broccoli, Florence fennel, etc. These last types of plants can be cut several times since they grow more fruit when we cut the first fruit. Each time we cut, the plant will grow new fruits; but if the plant grows too many new branches the fruit will get progressively smaller. If, on the contrary, we cut the plant and only leave two or three branches, we will obtain large sized fruit again.

We can also plant several types of edible flowers between the vegetables of our edible gardens and garden forests, such as marigold, sunflower, nasturtium, pansy, etc. These flowers will naturally spread their seeds and reproduce themselves. (Figure VI.32). We can make small posies with them to offer in our vegetable baskets. These flowers are melliferous as well, which attract beneficial insects such as the bee among others, which pollinate tomatoes, zucchinis, cucumbers, etc.





Figure VI.32.- Edible flowers in the garden

We can also plant different perennial aromatic plants that adapt to the area such as rosemary, lavender, perennial basil, etc., which have small flowers that are edible as well. Since the size of these plants is bigger, we need to plant them in strategic places like the corners of the beds or scattered in the center of the beds. These plants are melliferous and aromatic and thus very beneficial for our edible gardens and garden forests. We also make bundles with them.

As we have described in this Didactic Unit, we can obtain a significant variety of edible vegetables based on our experience in a place with a great potential for diversity during the entire year due to its climate. **With an appropriate permacultural design in another severe winter's climate, we will make the most of the useful planting season, and we can still obtain a variety large enough to guarantee the continuity of seeds and produce.**

## VI.6 Harvesting for the bio-boxes

The task of harvesting the vegetables, flowers and aromatic plants of our edible garden can seem, at first glance, a difficult and inefficient activity from the point of view of the time it takes to harvest them in comparison to harvesting vegetables that are growing in a bed with only one variety. Based on our experience we can ensure that this is not the case because in each bed we dispose of a great variety and quantity of products without having to move too much, in addition to the aesthetical design created by the students, that's why we gave it the name of edible garden.

With help from the field notebook and the weekly maintenance tasks of the beds, we can identify when and where to collect the vegetables that are ready to be collected that week. Remember that approximately all the allotments have the same diversity of vegetables.

The days when we harvest, we rotate the different allotments (Figure VI.33). For example, if we harvest the products that are to be consumed that week in one allotment, the second week we will harvest the products in a different allotment so the first one can grow and recuperate again. By doing so we can harvest the first allotment again in the third week, and so on.



Figure VI.33.- Different beds of the same farm in constant production and rotation of the harvest

**The harvesting of vegetables in such a diverse area, apparently chaotic due to our hole planting technique, becomes an important therapeutic exercise.**

We assign a different vegetable to each person of the center to collect in days of harvest. For a certain period, we will maintain the same assignment so the student can become skilled with the type of harvesting and can already start to identify the best places to harvest during the week.

**With this personalized harvesting technique, the students acquire self-assurance and learn to be efficient in their work when choosing what utensils and tools they need to take with them to go harvesting, for example, knives or pruning shears for cutting, and wheelbarrows or boxes for transporting vegetables.**

Once the person that participates in this activity feels skilled enough, it is crucial to rotate the assigned vegetable with a fellow student. This moment is a good opportunity for the most skilled person in the harvesting technique to teach this system to another person or new students of the course. **With this activity we encourage support in pairs (which is proven to be efficient on people with mental illness), making them develop their self-esteem and self-assurance, and making sure there is fellowship and communication between them.**

The people that work in the edible garden and garden forest during maintenance days (Tuesday, Wednesday and Thursday in our case) gather information about the vegetables that are about to be harvested without having to be aware of it. Remember that on maintenance days with our “hole plantation technique”, we plant seedlings near the vegetables that are ready to be cut. As a consequence, this information is gathered in the nomad dimension of our brain as a tacit knowledge curve that unfolds itself in the harvesting stage (Friday and Monday in our case).

We can choose the harvesting days that best suit us (Figure VI.34). It could be done on one or more days per week, as it is in our case. With our polyculture system we have

different types and varieties of plants, but also different sizes. If we do this, we will make sure we always have plants in different maturation levels in our edible garden. In our system the land functions as a storehouse since it allows us to keep vegetables in the soil for a longer period of time, giving us a bigger margin when harvesting, and therefore when commercializing with them.



Figure VI.34.- Collecting vegetables, edible flowers and fruit from the edible garden

If we only harvest once a week we need to identify and observe which vegetables are the most perishable and thus ready to be harvested, and which ones can stay a bit longer in the garden since they still have not reached their full growth.

As an example, if we grow head lettuce, we cut the ones that are tight and crispy, we cut the broccoli that is less tight and we cut the cauliflower when we see its fruit almost entirely, and if we needed to keep the cauliflower in the garden for a few more days we bend the leaves covering the fruit and protecting it from light since it turns the cauliflower yellow. There are other vegetables that can last longer in the ground such as leeks, onions, red beetroots, radishes, garlic, kohlrabi, etc. (Figure VI.35).



Figure VI.35.- Plants that can stay longer in the ground

On the contrary, in conventional systems, vegetables that are planted on the same day are harvested all together, so the products are more limited to commercialize. This could also happen in the ecologic system that usually plants the same variety in one section of the garden.

After harvesting with the people from the project we bring all the vegetables we have collected to the area of the market that is meant for cleaning and assembling the vegetable boxes (Figure VI.36).

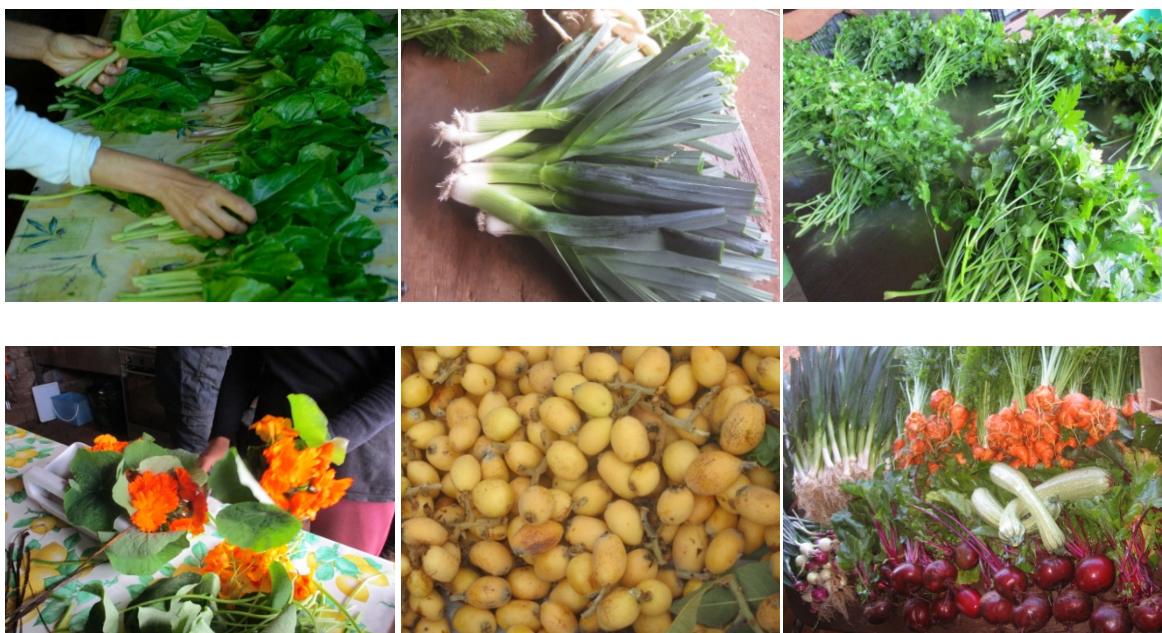


Figure VI.36.- Products at the vegetable market

We reserve one section of the market for the vegetables that require to be tied together in bundles, such as Swiss chards, parsley, coriander, edible and aromatic flowers... We tie the bundles with some kind of resistant plant fiber typical of the area that we have planted in our permacultural garden (Figure VI.37). By doing so, we avoid using plastic strings.



Figure VI.37.- Making bundles with banana fiber

Another section of the market is used for the vegetables of which roots and leaves need to be cleaned with water, such as red beetroots, leeks, radishes, carrots, lettuces, etc. We only remove the outer leaves of these vegetables that due to their aspect are not appropriate to sell. We only keep the young leaves since they keep the vegetable fresh for a longer period of time and because they also contain a significant nutritional value (Figure VI.38). For instance, we can use the leaves of the carrot as if they were parsley.



Figure VI.38.- Washing and cleaning different vegetables

**A different therapeutic activity that is interesting for the students of the PERMIND course is the organization, in spring, of an exhibition of a variety of crops of our garden in different stages of growth. A growth made possible thanks to the students. This exhibition can be organized in the greenhouse or another place that is suitable.**

For the exhibition, the users have to choose one of their favourite vegetables and observe the different stages of the plants they have chosen in order to present them artistically, and explain them by describing their stages in the correct order. This is a good exercise in order to work with the concept of cycle (Figure VI.39). For example, if they choose the red beetroot, they exhibit the greenhouse-sized seedling, the plant with its grown root, the flowering plant, and finally, the plant with its seeds.



Figure VI.39.- Sample-exhibition of the cycle of life of various vegetables

The aim of this activity is to observe the cycle of life, the biodiversity of plants that we have in our garden and the variety of seeds that we obtain. **The exhibition is a good opportunity to show the collaborators and visitors of the course the different tasks we do in the center, to make visible the work that people with mental illness do and the potential they have.**

## VI.7.- Commercializing our products

Every day more and more people want to eat healthier, a direct relation with the people that produce the food, an environmental and social awareness, and, as consumers, they adopt an active attitude towards agroecology in general, and Permaculture in particular.

We can channel the sale of vegetables, flowers, aromatic plants and fruits that we have grown in a permacultural way through different homemade short distribution channels such as a vegetable market located in the farm, with loyal collaborators that come to collect and buy the bio-boxes (Figure VI.40).



Figure VI.40.- Images of the project's vegetable market

When we are assembling the organic boxes, we teach the students the distribution of the edible products. At the bottom of the box, we place the heavier vegetables, for example, red beetroot, leek, carrots, onions, zucchini, kohlrabi, etc. (Figure VI.41).



Figure VI.41.- Placing the heavier products at the bottom of the bio-boxes

On top of the heavier products we place the smaller ones such as peppers, eggplants, broccolis, etc. Next, we put bundles of Swiss chard, spinach, parsley, coriander, etc., and we finish by putting lettuces and the most delicate products such as the edible flowers.

**By creating bio-boxes this way we stimulate the organization of the users and their attention towards tasks that require gentle handling, and we encourage their creativity when distributing the boxes** (Figure VI.42).



Figure VI.42.- Last steps in the process of assembling the bio-boxes

People can purchase the boxes by either choosing the option of having a fixed weekly box, which has been elaborated by the people that participate in the project according to the weekly production of our edible gardens and garden forests, with a previous price agreement that is maintained throughout time; the option of buying boxes with the products of their choice, which have variable and higher prices; or the option of only purchasing specific products.

We could say, based on our experience of selling bio-boxes, that the most convenient option in order to have a stable and profitable project is the fixed box option that depends on the production and harvest of each week, with a price agreement that is maintained throughout time and loyal collaborators that purchase the boxes once a week or every other week (Figure VI.43).



Figure VI.43.- Assembled bio-boxes, ready to be picked up

With this system we also make the collaborators of the project aware of the fact that boxes are not prepared by their demand, but according to what the garden offers us depending on the season of the year and the planning of the cultivations. This allows the collaborators to participate in a constant learning exercise by discovering new vegetables and fruit, and having a balanced diet with the appropriate nutritional variety (Figure VI.44).



Figure VI.44.- Products of a bio-box in the house of a collaborator

In our case, collaborators receive more than a hundred edible and aromatic plants throughout the year from the more than 300 varieties that are produced in our edible gardens and garden forests.

Selling the boxes at our vegetable market is also a great opportunity to inform the collaborators about the properties of the flowers and aromatic plants by placing fact sheets in one section of the market with information about the ones that are put in the boxes of that week (Figure VI.45). **The participants of the course can design these fact sheets in an artistic way with help of the instructors.**



Figure VI.45.- Fact sheets of flowers and aromatic plants in our vegetable market

The moment of selling the bio-boxes is also another opportunity to carry out an interesting energy exchange.

When the collaborator comes to pick up his bio-box, he carries an empty box and a filled bucket from his house. The bucket, which he will leave in the farm, is filled with organic waste produced in his house that week. The empty box is the one he picked up the previous week with vegetables, fruit, aromatic plants and flowers, which were used by the collaborator's family during the week.

The energy exchange is done when the collaborator leaves the farm with a filled box and an empty bucket: the box filled with vegetables, fruit, aromatic plants and flowers for the family's consumption, and the empty bucket for the organic waste produced that week.

It is an interesting energy exchange of the project in terms of closing an energy cycle between food and organic waste management.

If we have vegetable and fruit surplus that week, we can sell it to organic operators from farmers markets, local shops, groups of people that purchase directly from the producers, slow food restaurants, hotel restaurants, school cafeterias that support healthy diets by using organic products, etc. By doing so we strengthen the idea of a local development network.

**In our case there is an extra value added, which is the social dimension of our therapeutic and rehabilitation center for people with mental illness: the value of the people we share knowledge with.**

#### VI.8 To summarize

Along with the pleasure of growing our vegetables, we enjoy obtaining our own seeds and observe how the development cycle of each variety is carried out by looking at how the plants bolt, how they bloom, and how they are pollinated and form seeds. It is also a pleasure to have a wide plant and animal biodiversity that ensures and enriches life in our planet so that future generations can enjoy it as well (Figure VI.46).

The different stages of sowing, maintaining and harvesting offer us the perfect opportunity to remember what we are as a human species, to really feel being part of the environment. Of course, this also means that we have to respect and accept our nature inside of the natural system of the cycle of life, accepting the natural rhythm of all things. What might appear to be an inconvenience can even turn out to be a great advantage (for instance, weeds might seem bad at first, but they are not so bad after all).



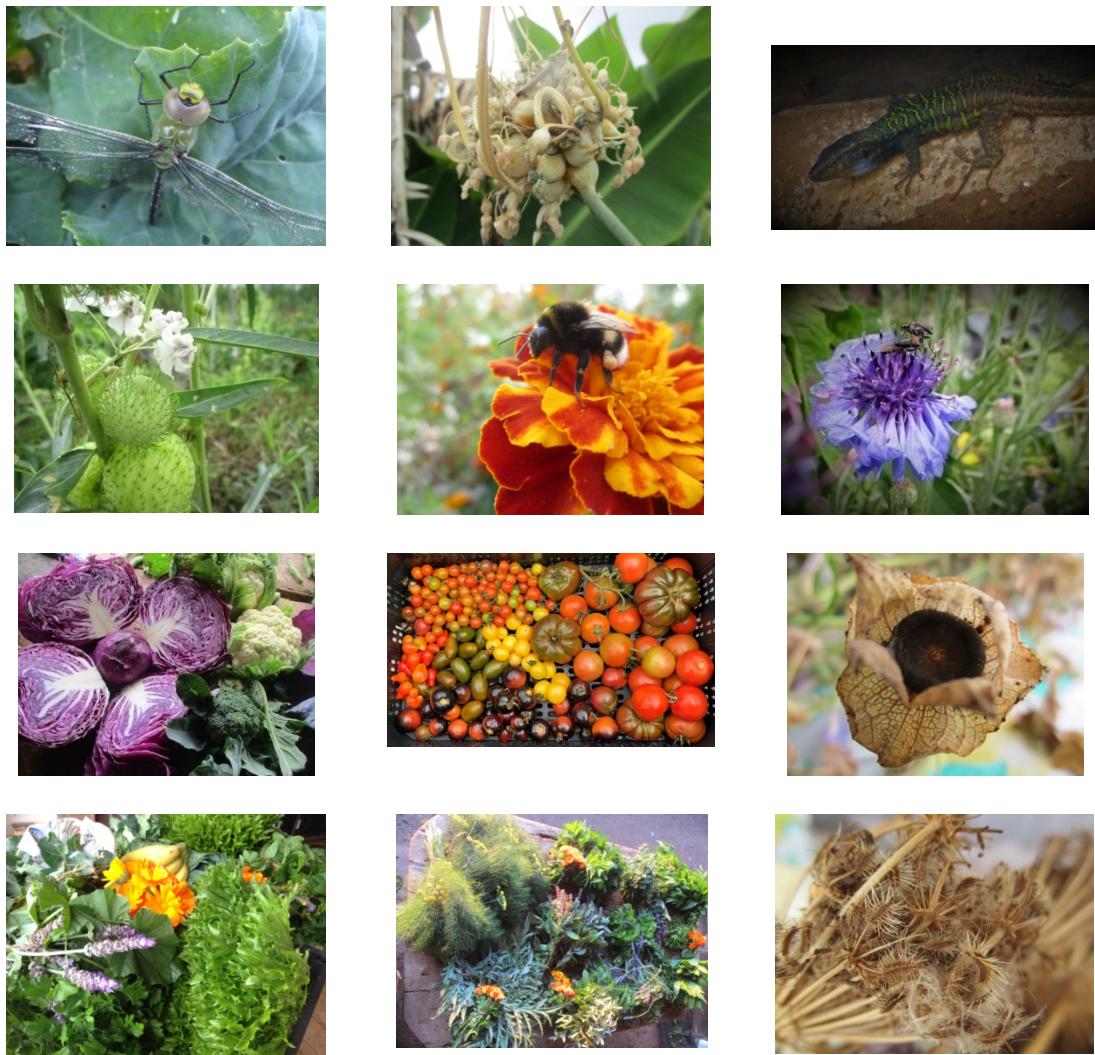


Figure VI.46.- Colorful in our edible garden and forest garden, and in our farm market

## Didactic Unit VII.- BIOCONSTRUCTION AS A FORM OF THERAPY



### VII.1.- Mud as a form of therapy

In this didactic unit we want to share our experience in bioconstruction with mud. Stomping with our feet and building with our hands is an experience that benefits us therapeutically from the point of view of the psychic and physical dimension of health.

Different techniques are used when building with raw subsoil, being all of them very interesting, but in our case, we are going to discuss the Cob technique (Figure VII.1). With this technique, we also try to inspire the rescue of self-construction.



Figure VII.1.- Cob close-up

There are several advantages of building with mud: it balances the humidity of the air inside the building, it preserves an average temperature due to its thermal inertia, it is resistant to seismic activity, it is fireproof, natural buildings like these do not produce rubble, and it is the most efficient from the thermal point of view.

These advantages are to be considered, especially when comparing to the disadvantages of using cement, which is a highly used material for building that needs a lot of energy, it contaminates when manufactured, it produces pollution, it needs a lot of steel when building with it, a lot of paper for its packaging, and it produces loads of rubble.

The Cob technique was mainly developed in countries where it rains most of the year because once the mud mortar is prepared it is ready to be used directly on the construction without needing to create bricks which need a favourable time of the year in order to dry, and without needing much space outside as it occurs with the adobe technique. With the Cob technique, the mud is applied and dries on the construction itself.

We chose the Cob technique because we believe it is the most practical, easy and therapeutic of all the techniques. Practical since it is used directly on the construction, and thanks to the diverse possibilities of repairs, remodellings and new constructions. It is easy because of the noble materials used, and because it is simple to elaborate and handle. **It is therapeutic because we do teamwork in a fun way by carrying out group dynamics with the students and by listening to music while we create the mud** (Figure VII.2).

**We also teach basic knowledge of old-fashioned constructions to the students in a more healthy and self-sufficient way, and by doing so we create a pleasant and different type of activity, encouraging teamwork, relationships among the students and team spirit; it also maintains the learners in the present moment by assuming responsibilities, such as paying attention in order to pour the correct measures in the mixtures. All this gives them a sense of fulfilment.**



Figure VII.2.-Bioconstruction therapy

## VII.2.- Noble materials for building

The materials we need in order to create the mud are: subsoil or clay, sand, plant fibre and water. It would be ideal to obtain all the materials from our area. The subsoil and sand deal with compaction whereas the fibre deals with traction, making the mixture three to four times stronger.

**We can obtain the soil or clay from our own property by doing a small excavation and digging out the subsoil with help from the students of the course. The beneficiaries of the project will notice that underneath their feet, they've got a crucial material that can be used to build many things.** We could also find subsoil in a construction site nearby.

It is necessary to sieve the subsoil in order to remove the stones it could contain, which allows us to work with our feet without getting hurt (Figure VII.3).



Figure VII.3.- Sieving the subsoil of the surroundings

If we have built diversion channels for water management in our design, as we saw in the Didactic Unit II, the sand can be found after rain seasons in these channels, just after it ends and before the ditch starts. In this spot, some sand usually piles up when it's raining. **After it finishes raining we can organize activities with the group of students in order to collect sand in our property and then store it so we have it available when it is time to work with mud** (Figure VII.4).



Figure VII.4.- Material sample (subsoil and sand)

The plant fibres could be straw, pine needles, woodchips, etc. (Figure VII.5). We can cultivate them in our permacultural design. If this were the case, **we can involve the beneficiaries of the project in the collecting and storing tasks of the plant fibres that we will later use for bioconstruction**, the same way we did with the collection and storage of the subsoil, sand and gravel.



Figure VII.5.- Sample of plant fibres (woodchips, pine needles and straw)

The proportions of the materials used in natural building are not standardized; there are no exact measures. Depending on the area, the subsoil could have more or less clay and sand, which means that it is necessary to conduct tests before starting to build so that our mud has the most accurate proportions as possible in the mixture that we will later use.

**We can transform the tests to find out the necessary proportions and the appropriate conditions for its use into a group activity with the students.**

The test consists of only mixing the subsoil with the sand, and creating at least three mud discs with different proportions. We can make the first disc, for example, with a ratio of one part subsoil to one part sand, the second disc with the same measure of subsoil but two parts sand, and the third disc with a ratio of two parts subsoil to one part sand.

We first mix the three dry measures of subsoil and sand in separate containers to make three discs; to each dry mixture we add water little by little until we obtain a dough that is not too watery. We shape the dough into a disc with a thickness of one finger (Figure VII.6). We number them from one to three and then we write down in a piece of paper the proportions of each test with the corresponding number of its disc. We then place the discs in a shaded place, sheltered against wind and humidity, hoping it will get well dry in a few days.

The disc that does not have any cracks or that has very few is the one we will use as reference, it is the disc that gives us the correct proportion of subsoil and sand, which we need in order to make our Cob mud.

If the three discs with the first proportions all have significant cracks, we would need to continue carrying out tests with different proportions until we obtain the disc that we can use as a reference.



Figure VII.6.- Image of tests on the disc-shaped mud

We have experimented with a different model by using the trial and error method: we have exposed the discs to dry directly to the sun with the purpose of testing the material in a more extreme condition from the point of view of this activity. This experience has provided us with the knowledge that the disc that does not get any cracks has the ideal material proportions for a most resistant disc. This is something we learn by doing.

### VII.3.- Getting our feet muddy

Once we have finished testing the proportions that we need of the materials we have, we will start the next activity, which consists of making the mud. In order to do this activity we need tools such as wheelbarrows, shovels, hoes, reused tarp and several buckets of the same size in order to match all the proportions (Figure VII.7).



Figure VII.7.- Images of the different tools used for green building

**The measures we provide in this unit of the PERMIND Training Guide are only for guidance.** In our case, and with the materials we have available, the proportions of the disc that does not crack or hardly cracks are: 1 part subsoil, 1.5 part sand, 0.5 part straw, and 0.75 part water.

The final quantity of water depends on how humid the rest of the materials are, and, if they are humid, the mixture will already have water in it, which is important to take into account when adding more or less water. If this is the case, we recommend adding water little by little to avoid pouring too much and obtaining a watery mixture.

When it is time to start with the bioconstruction, we form groups of three to four people with the students of the course. It is the most ideal and balanced number of people that makes it easier to perform the different movements needed in this activity.

In order to work with this group and to produce the appropriate quantity of mud, we double the proportion of materials of the disc that does not crack or that hardly cracks. This would be 2 parts subsoil, 3 parts sand, 1 part straw and 1.5 part water. **We always use several same-size buckets as measurement tools.**

We pour the different components on a piece of reused tarp of a minimum of 2 x 2 meters. We first pour the sand, followed by the subsoil on top, or the other way around. We mix both materials with a hoe until we obtain a uniform mixture; we pile it up and then carve a small depression in the centre, as if it were a crater of a volcano. Then, we add water little by little into the crater, while simultaneously mixing it into the uniform mix, until the mixture transforms into a mud paste (Figure VII.8).



Figure VII.8.- Images of the process of mixing subsoil, sand and water

**Now the time has come for some foot therapy, where students and instructors start to take off their shoes and do group activities, such as dancing and singing to fun songs, or walking in circles while the mud is being kneaded therapeutically in order to shape it like a "burrito".**

After we have been singing, dancing and stomping on the mud for a while, and there aren't any remaining dry parts of the subsoil and sand mixture, two people of the group grab the tarp from opposite sides and pull it towards them in order to make the mixture rotate and form half a "burrito" with the paste; we then repeat the same process with the other side to complete the "burrito" in the centre of the reused tarp (Figure VII.9).



Figure VII.9.- Images of how the tarp is used to shape the mud like a "burrito".

After the "burrito" has been created we stomp it again while another member of the group pours a bucket with the right proportion of straw over the mixture, using his hands in order to scatter it and trying to mix the straw well. We pour the straw little by little while we step on the mud and make new "burritos" until the right quantity of straw is added. We continue stepping on the mix and creating "burritos" with the sides of the tarp until the straw is fully incorporated into the mixture. If we notice the mud has gotten too dry, we can splatter some water as we continue stepping until we obtain a uniform and flexible paste (Figure VII.10).



Figure VII.10.- Images of the foot therapy: adding plant fibre, stomping on the mix and creating "burritos"

There is also the option, which we use, of starting not only by mixing the dry sand and subsoil, but also adding the dry straw to the mix from the beginning, mixing the different materials very well (Figure VII.11). Then we continue with the previously described process of adding water and creating “burritos”.



Figure VII.11.- Image showing the option of mixing all the dry materials (straw, sand and subsoil)

**At this moment, the students need to carry out tests in order to make sure that the mud is completely ready for use.** One of the tests is making a Cob mud ball with both hands until it is firm, we then drop it to the ground from shoulder height to see if it cracks or not. If it does not crack it means that we have got a good batch of mud that is ready to be used as building material.

We can also carry out the following test: with both hands we make a small and compact “burrito” with a diameter of about 3 to 4 centimetres, and a width of about 15 cm long; we grab it with one hand from one end leaving the rest of it hanging, and therefore checking if our mud is flexible and capable enough of resisting without breaking. If it stays as it is without breaking, it is ready to use (Figure VII.12). If it is split is that the mixture is not well trodden. In that case we would have to keep stepping on until the mud mix well.



Figure VII.12.- Images showing both quality tests of the mud

Once we have used one of the tests to check if the mud is completely ready, we can use it to construct right away (Figure VII.13). We can also leave the mud to rest several days by covering it with humid sacks for later use, without deteriorating the batch. If we were to leave it longer time without using we just have to keep in mind that the mud shouldn't get wet with the rain. The only thing that could happen is that it gets dry, but we can solve this problem by wetting and mixing the mud again when we need it.



Figure VII.13.- Mud ready to be used for building

**By the end of this activity we will have a very pleasant feeling of wellbeing in our feet and legs.**

We do this therapeutic task barefoot on the tarp to avoid getting stones into the mixture with our feet. If we have to get off the tarp, we need to put on some kind of appropriate footwear, such as bathing slipper that we will take off when we get back into the mixture of the tarp. When we finish the activity, we will wash our feet using buckets of water we prepared previously (Figure VII.14)



Figure VII.14.- End of feet therapy

#### VII.4.- Getting our hands dirty

We can use the mud that we have made in any construction or restoration project, for example, in big construction sites like houses, small sheds, bathrooms for a farm, markets to sell products of the farm, shelters for animals, etc. and also smaller constructions such as ovens or fireplaces, or to repair walls and floors, all kind of small restorations needed in the construction, sculptural details, built-in furniture, etc. (Figure VII.15).



Figure VII.15.- Several green built infrastructures and objects in El Mato Tinto farm

**Now it is time for some hand therapy, where the students and the instructors can prepare group or individual activities in order to transport the mud directly to the constructions or to projects that we need to build.**

If we consider the walls of a house, bathroom or small shed, etc. we will suggest two ways of building them.

**The first way** is to construct without using any attachments or framework. In this case the walls need to be thicker, of about 50 cm if it is a load bearing wall, and of about 30 cm wide if it is a dividing wall. Therapeutically speaking it would be ideal to perform this task in groups of at least two persons, located on each side of the wall, who can grab the mud and shape it over the previously prepared foundation to create the wall. It is also possible to create a chain with more persons in order to transport the mud to the place where the wall is being built.

The persons that are constructing the wall – one at each side – will press on the mud with their fingers so it forms one dense whole. It is important to continue doing this until reaching an approximate height of 15 to 20 cm (Figure VII.16).



Figure VII.16.- Building the wall directly with Cob mud

First, we construct the entire length of the wall at the same height. When we are finished, we will start again at the beginning, at this point the Cob mud has had time to

air and can be covered by the next layer; we repeat the process again with the same thickness until we reach an approximate height of 40 to 50 cm, leaving a coarse layer at the top so the following layer can attach better when we continue the next day. At this stage of the process, we will stop working this wall for this day. We have to take into account that the height of the wall that we can build in one working day depends on how much water the mud contains.

It is important to not make the wall taller than the approximate height we recommend in order to avoid the mud wall from becoming uneven. Once we have reached a height of 40 to 50 cm, it is necessary to stop working on it until the next working day since the mud we have placed will have aired enough so the next layer can be added on top; we will repeat the same process adding the same height again, until after several days we complete the desired height of the wall.

If we had to build several walls, we could make more groups, guided by the instructors, that can add mud on all the walls without building them higher than the height we recommended before. This height depends on different factors: how watery our mud is, how sunny the day is, and especially how experienced the persons are getting by applying this technique.

Once we have finished building the walls, we can apply a thin layer as a finishing touch. In order to obtain the correct mixture, we first have to sieve all the materials (subsoil, sand and straw) using a sieve with finer meshes, and using the same ratios as when we made the mud. If we wanted to paint the walls, we would need breathable paints, such as lime wash paint so the mud doesn't lose its breathing capacity.

**The second way** of building the walls is by using recycled woods such as pallets, boards, etc. which can be used as attachments or frameworks for the mud (Figure VII.17). We can carry out the task of collecting used materials with the beneficiary students of the course.

The attachment and framework task with wood can also be done with the students, starting with the carpentry where we can build all the walls with wood leaving spaces for the door and windows; we can also install the electricity by placing the cables inside the pallets or boards so that they get covered when the mud is added, marking on the outside where the light fittings, switches and outlets go. If it is a bathroom or kitchen, we also install the pipes in between the wood, also marking on the outside where the water comes out, and therefore making it all ready to add the mud.



Figure VII.17.- Using Cob on the framework (with pallets)

We might need professionals to guide us through these tasks, or instructors to go through some training so that they can learn how to do them. **In any case, the students can participate in these activities by doing the simplest tasks; being a part of the whole building process makes them have a sense of belonging that fulfils them** (Figures VII.18 y VII.19).



Figure VII.18.- Building a composting toilet with pallets and Cob mud in El Mato Tinto farm



Figure VII.19.- Building the vegetable market with pallets and Cob mud in El Mato Tinto farm

When we are building the wall, we insert the mud with our hands in between the pieces of wood, covering completely all the pallets and boards on the inside and on the outside, and, if it were the case, we would also cover all the plumbing and electrical wires.

We can also install electricity and plumbing after we have added all the mud, leaving them in plain sight and then covering them with some kind of embellishments.

It is important to build eaves on outer mud walls to prevent them from getting wet in rainy seasons. If they didn't have these eaves, we would have to protect the walls with lime wash, lime mortar or something similar so it would keep its breathability. We also have to build wide plinths in case the rainwater splashes. We can solve this by installing gutters on the eaves to collect and store water (Figure VII.20).



Figure VII.20.- Bioclimatic classroom where we can notice the eaves with gutters that avoid splashes

We can integrate glass bottles of different colours in these mud walls as if they were stained glass windows. **The students can make a creative design for the stained glass window on a piece of paper.**

If the width of the wall is the same as the width of the bottles, we integrate them into the wall following the design guidelines (Figure VII.21).



Figure VII.21.- Detail of the stained glass with integrated bottles and building the stained glass wall

If the wall is wider than the bottles, we would need to cut them in order to integrate them into the wall. For this task, we need a table saw with a diamond blade and someone with experience or enough knowledge to be able to use it. If we do not have any of this available, a nearby workshop can take care of this job.

This process consists on collecting two identical bottles and cut them at the same level. To build the stained glass we only use the bottom of each bottle. We clean and dry thoroughly its interior and we attach both pieces to each other with an adhesive tape. The length of the combination of the two pieces must be the same as the width of the wall. This is important to take into account when cutting the bottles.

By doing so, we leave the bottom of one bottle at one side of the wall while the other bottom is on the other side, making it possible for the light to pass and creating a skylight effect without losing the green building insulation since the rest of the surface of both bottles is covered completely with mud (Figure VII.22).

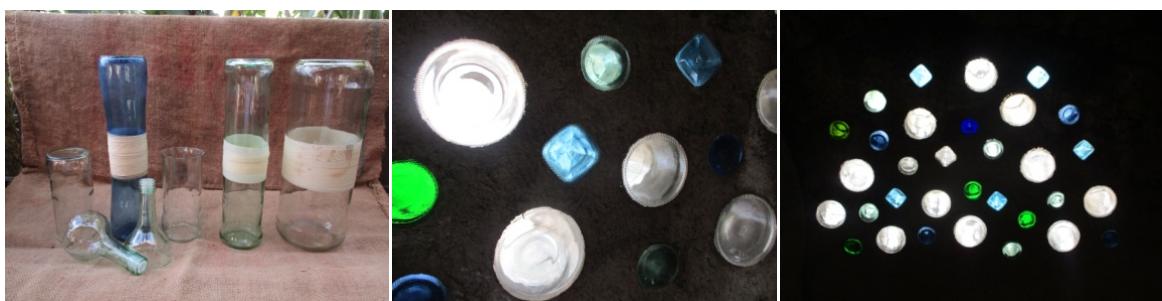


Figure VII.22.- Images of bottles attached and integrated in the Cob wall

We can also integrate slightly tilted bottles in the mud walls with the neck of the bottles pointing up so that they can function as hooks or coat hangers. **In our case, we used them in the changing room of the people we work with, as they built the hangers themselves, they gave them a personal touch by decorating them with mud, which also created a sense of belonging** (Figure VII.23).



Figure VII.23.- Using bottles as coat hangers with green built art on them

**There is also the possibility of building smaller projects, which doesn't mean they are less important or less therapeutic, such as building a wood-fired oven made out of mud, since its insulation and heat retaining capacity makes it ideal to bake bread and cook all kinds of baked dishes (Figure VII.24).**



Figure VII.24.- Front of the stove made out of mud

We can also build small energy-efficient wood-fired stove with mud, which are very practical since they do not need much firewood to cook food (Figures VII.25 y VII.26).



Figure VII.25.- Building a stove out of mud



Figure VII.26.- Functioning mud stove

We can repair or restore mud walls that need plaster, or that are cracked or broken; we can use tools such as flat or normal trowels, mud mixers or sponges for these tasks (Figure VII.27). **The students can use these tools on these small projects in a fun way, and acquire the skill of handling them by doing so.**



Figure VII.27.- Images of walls made out of mud. Exterior to be repaired (left) and interior filled with plaster (right)

We can also build or repair floors; for this we need to compress the mud very well so it stays strong. Once it is dry we treat it with linseed oil to make it more sustainable (Figure VII.28).



Figure VII.28.- Repairing floor and countertops with mud

We can incorporate art into each one of the bioconstruction activities. But we can also create workshops with the only purpose of building decorative sculptures or sculptures that can be used to cook with (Figure VII.29).



Figure VII.29.- Using raw mud in therapeutic and fun art workshops

**When we have made our Cob mud creation, we will have a very pleasant feeling of wellbeing in our hands, the same feeling we had after stomping the mud with our feet.**

In this unit we have included the essential explanations in order to do bioconstruction projects with the students even though we do not have any previous experience with mud. We always recommend for the instructors to take courses or go to workshops in their area to learn and get more knowledge about natural building (Figure VII.30).



Figure VII.30.- Images taken before and during a bioconstruction workshop

Our intention is to highlight all the usages and benefits that using mud can have in our way of cooking, working, sheltering or just simply living.

### VII.5.- To summarize

The way we live in our planet should be coherent with nature: not only knowing how to eat in a healthy way without depleting natural resources, but also knowing how to live without damaging, contaminating and wasting energy unnecessarily.

Building with mud is a noble activity that gives us shelter, saves energy without destroying or contaminating, ensures our wellbeing, provides us with warm conditions by absorbing the humidity from our homes and workplaces, and solves health problems related to respiration and the skeletal system (Figure VII.31).





Figure VII.31.- Images of the hand and foot therapy

**Without a doubt, the persons that benefit from mud therapy will have a sense of safety throughout the whole process since the best tool to work with mud are our hands. Undoubtedly, those persons will feel fulfilled when they can look back and enjoy what they have created (Figure VII.32).**



Figure VII.32.- Light passing through the bioconstruction building

## EPILOGUE AND ACKNOWLEDGEMENTS

*"Diversity, harmony and mutual support"*

*"Care of the Earth and its people"*

*"A place of absolute integration, where respect and understanding of the land have obtained their best achievements."*

*"It invites to reflect about the consistency of decisions, habits, proactivity, life philosophy of every one as a free being and in harmony with the place we inhabit."*

*"This farm goes beyond permaculture and agroecology concepts; it's a way of living and feeling nature. It has a soul, it's not only what you can see, smell or touch in it. Every time I have the opportunity to visit them I leave convinced that this project works, it's very much alive and far away from economic or productive concepts (which I barely understand), I feel that it helps the neighbourhood."*

*"You're an example to follow. 'Collaboration, cooperation, patronage, common good, mutual help, biodiversity...'; what more could you ask for? Here everything has its place and nothing clashes. Regarding suggestions I can only ask you to keep on working as you've done until now because you're in the right path. Keep sharing your enthusiasm and knowledge with the world"<sup>5</sup>.*

The trial-and-error method behind the experience described in this guide is certainly part of the most genuine search of that what brings us closer to the heterogeneous mass of diverse forms of life in which we to fully integrate in order to reach the result we are looking for. In other words, becoming an integrated part of the landscape not as a painter but as part of the painting.

In the various didactic units of the PERMIND Training Guide we wanted to reveal how Permaculture identifies itself with the conscious design and maintenance of the productive agricultural ecosystems that have the same diversity, stability and strength of the natural ecosystems. Through the observation of the natural ecosystems, we design production systems that meet human needs and the restoration and conservation of the environment.

Systems based on Permaculture principles promote this protection and restoration and recover soil quality, protect biodiversity, integrate the edible gardens and garden forests with its fertilizing trees; cultivate soils with permanent covering and recycling of nutrients; manage most efficiently rain water infiltration; reduce water

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<sup>5</sup> Impressions of local technicians and politicians of the Red Terrae (Local association of the agroecological reserve territories network) and the Tacoronte city hall after the "ground connection" with the Finca El Mato Tinto on June 21<sup>st</sup>, 2017.

consumption and therefore water footprint; reduce energy consumption through a higher energetic efficiency; is a climate change adaptation model for its endurance and a mitigation model that decreases the carbon in the atmosphere in order to fight greenhouse effect and climate change; improve nutraceutical quality of food; help to close different cycles: energy, nutrients, materials and water; extend products life cycle; help agroecological resilience; provide edible gardens and garden forests to improve the agricultural landscape; contribute to the recovery of abandoned and degraded cultivated lands in order to stop desertification; don't use fertilizers or chemical manure; help to raise awareness and training about environmental issues, etc.

From the psychosomatic perspective our current behavior is overall sedentary if we compare it with our brain "age", which is still predominantly nomadic. The "nomadic" brain displacement in nature works following security objectives such as habitat and food; that is why some mechanisms for the pursuit of these objectives are developed. Permaculture emulates the principles of nature transmuting the idea of a natural ecosystem in cultural ecosystems and in edible gardens and garden forests.

We want to promote the nomadic dimension of our brain through the permacultural practices in a fresh and pedagogic dimension. This helps from a therapeutic point of view given that these practices reconnect us with nature, where we came from and on which we turned our back. The connection with nature through the daily discovery of "new settlements" of nutritive supply in our edible gardens and garden forests area challenge of new discoveries for the brain that stimulates our memory system.

In previous didactic units we talked about the **importance of cultivating in Permaculture**: cultivating environment observation, cultivating water and soil, cultivating biodiversity. Adding up all these cultivations, there is no doubt it results in more healthy products. **But in order to facilitate these crops in a community way, we have to be aware of the importance of the cultivation of human relationships; this is where mental health occurs.** It is a cultivation of human relationships through reconnection with nature, a nature that we have turned our back on with our technological arrogance. We have to go from the co-responsibility phase of destruction in which we are installed, to a phase of co-responsibility in the restoration. This is one of the objectives of this guide and the reason we wrote the PERMIND Training Guide in first place with the **cultivation of therapy**.

We now end the guide with a **PERMACULTURAL ACKNOWLEDGEMENT** to every person that during the past 23 years have inspired and shared our trial-and-error method in the **observation and human relationships cultivation** in the Finca El Mato Tinto, ADP headquarters. To those persons that have collaborated to the PERMIND Training Guide development, editing and revision. We want to refer in particular to the

workers of the Special Employment Center of Finca El Mato Permacultura that are the inspiration of this training guide.



## PERMIND Training Guide

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