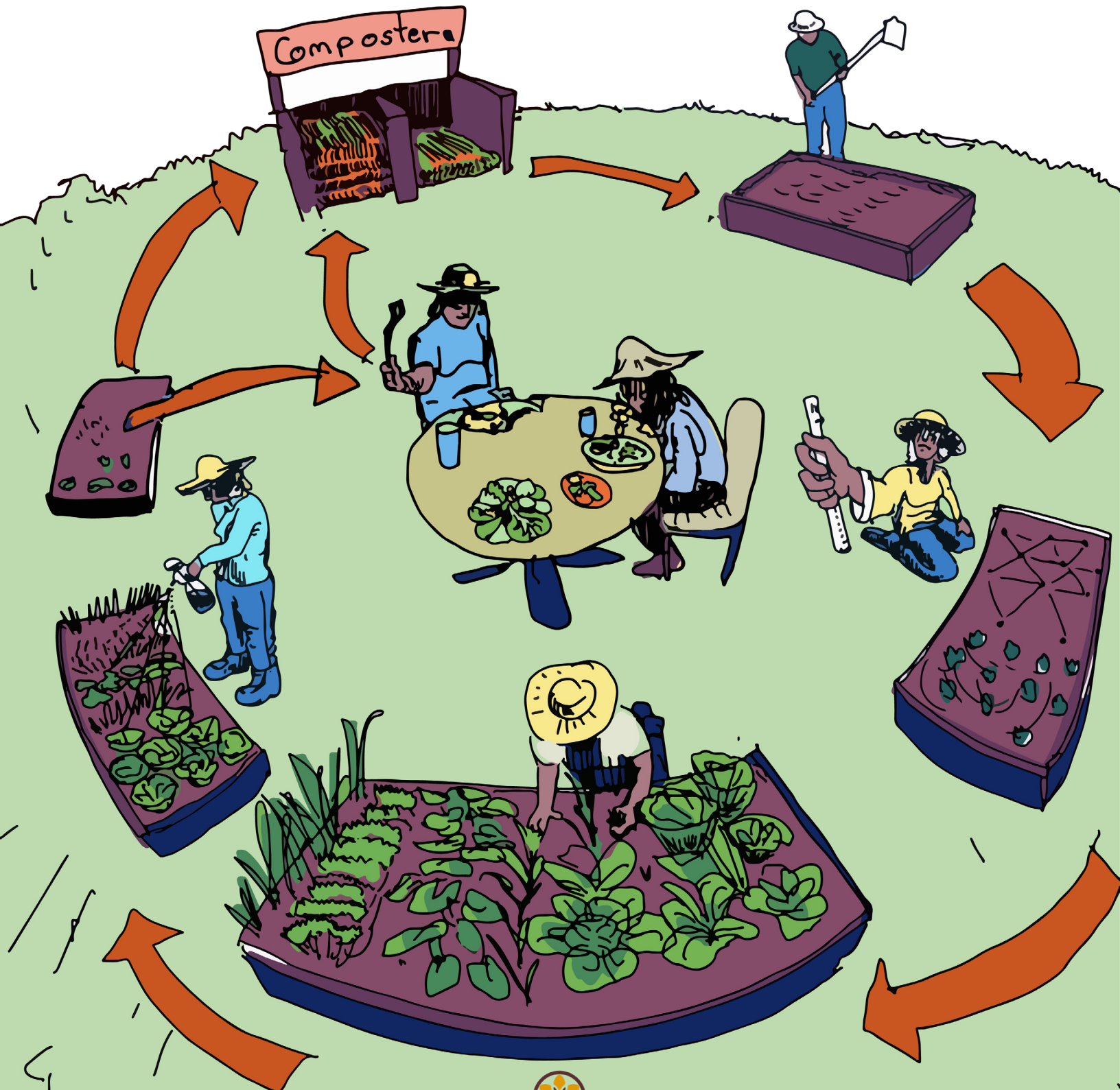


Basic Course of Urban Agriculture

Compendium of illustrated guides, based on practical cycles of nature



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ASSOCIATION FOR
REGENERATION



HIDDEN VALLEY FARM

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**Scan the QR code
to access the virtual
course!**

This document was produced in collaboration with the Bilili and Huertas Donde Sea team, allowing its reprinting for non-profit educational purposes as long as it is mentioned and the respective authorship and the institutions that made it possible.

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Its objective is to serve as a complement to the First Basic Agriculture Course Urbana from the Bilili interactive platform. This platform in turn promotes integration of environmental initiatives and the replicability of eco-techniques from citizens.

Virtual Permaculture is an interactive platform, a “living library” that seeks to motivate you to reconnect with nature using technology as a means, not as an end.

Here, you can access videos, manuals, maps and much more content to learn to replicate eco-techniques in your own home, community and work.

You can access content free, by entering the website bilili.org or by scanning the QR codes that you will find in public space and related projects.

The objective is to facilitate your access to information so that, together, we can develop actions that regenerate the planet.

Platform: www.virtualpermaculturecr.com
Contact: edu@avercr.org

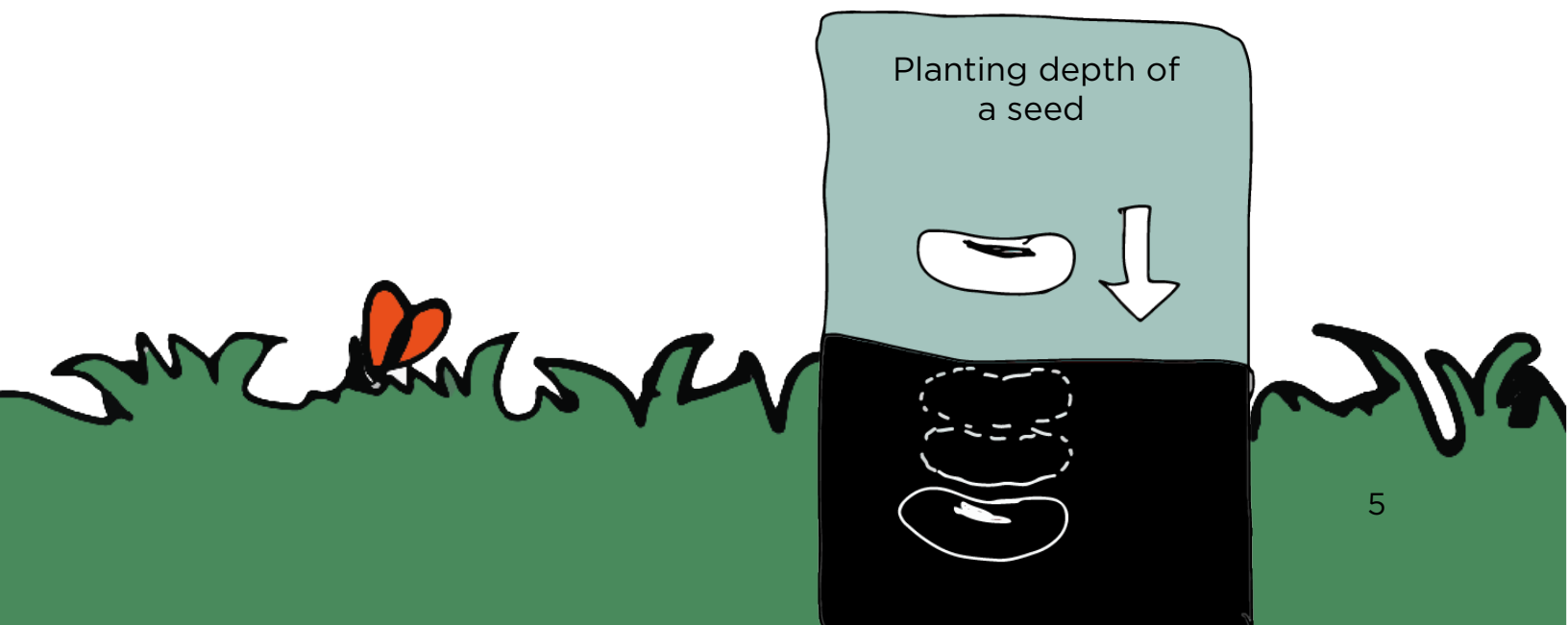


**Scan the QR code
to access the virtual
platform!**



“Law of sowing the seed”

Sow 3 seeds per plant hole, the first one for the bird and the butterfly, the second one for the neighbor and the third one for you and your family.







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“The population tends to grow quickly, faster than in times past, in a near future, the art of more value will be to obtain a comfortable subsistence smallest piece of land. No community whose members possess this art, it will be victim of any oppression. Bliss community will be independent, without crowned kings, nor kings of the money, nor kings of land.”

Abraham Lincoln

Introduction:

With the intention of constructing a practical document that guides us and motivates us to start with our garden, we would like to invite you to ask the next question: How much surface area of arable land is needed to completely satisfy one person? In 1971, John Jeavons (creator of the Biointensive Method) began to look for an easier and more productive way. The methods used in this basic course make use of all the wisdom he gathered during the last 50 years of experimentation and our own experiences of more than 12 years.

Based on Rudolph's Biodynamic Steiner Method, John began a series of essays and he published them in approximately 70 brochures and magazines, as well as several books. At this point, his “Grow Biointensive” method has been translated into many languages and is used in more than 130 countries around the world.

In thousands of small rural communities and urban areas in developing countries, this method has been appropriate to provide food security to families, communities and individuals using only natural resources and producing more food in less space.

Developed for small and medium scale organic agriculture, the methodology is simple but very efficient. Because of this, communities can easily adopt these practices.

Compared to mechanized agriculture, with the Biointensive Method:

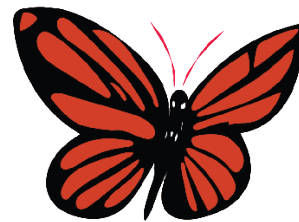
- No chemical fertilizers, pesticides, or even “specialized” machinery are required; Common tools are the most advanced technology needed.
- Produces up to 4 times more product, in only 1/4 of the space needed, even in difficult ground condition.
- Organic waste is used.
- Human/mechanical energy represents only 1% of each unit of food that it is produced.
- Reduces total water use by 70% in comparison with mechanized agriculture.
- Generates independence of inputs and promotes self-sufficiency.
- Regenerates soil fertility, while producing food.
- Conserve local seeds and open pollination.

This method allows us to cultivate a large amount of food in a reduced space, while minimizing the need for external inputs, but the greatest advantage is that it rebuilds soil up to sixty times faster than nature itself, promoting the decarbonization of the atmosphere.

We must be aware that the first 30 centimeters of soil, what is commonly called: “the horizon,” is probably the most valuable and most neglected natural resource. Conventional agricultural techniques destroy this layer seventeen times faster than the time it takes nature to rebuild it. If we continue with these current destructive practices, we only have land left for another 50 to 100 years.

The two priorities that humanity has at this planetary moment are to produce sufficient and healthy food, hopefully locally, while at the same time conserving and regenerating arable soil. But, although the importance of this seems evident, there are very few coordinated efforts to achieve it.

As John Jeavons said: “In this age, mankind is rich in opinions and knowledge, but poor in practice.” This is an invitation to everyone to cultivate their own Biointensive garden; to connect with the nature of the planet, take advantage of local resources, to eat healthier and fresher, taking the first step towards being coherent between what we talk and do, for the regeneration of the planet.



Vegetable garden

When it comes to starting an urban garden, the first thing is to have desire and commitment. Yes we have decided to transform a conventional or opportunity space (can be a balcony or an internal space with good lighting) into an edible garden or an orchard, so the first step is to observe. Permaculture is a method of sustainable human settlement design which says that nature is the greatest of all the teachers and that if we observe it with attention and we work with it and not against it, it will guide us to obtain the best of designs in the available space we have.

We invite you to observe: where is the sun's energy? In what direction does the rainwater flow? Which is the native fauna and flora? What space do you use frequently? What space is used for playing?

Answering these questions will help you find the site with the greatest opportunity. Find a paper and pencil and make a sketch of the area and the main FACTORS to consider to make your design decisions:

F1- Terrain Slope: The main thing is to prevent soil erosion by surface runoff of rainwater. We seek to "sow" water and have our cultivation beds in a position perpendicular to the slope of the terrain, in other words, you can use a codal or "A Frame" as a tool to obtain the contour lines and based on how you are making your design.

F2- Sun Exposure: Always try to take advantage of the eastern sun, the morning sun. If the terrain is flat, place the beds in north to south, since it is the way in which less shade is made from the plants and more use is made of the lost area in the hallways.

Have you ever thought about how useful it would be to use rainwater to water your plants? Learn how to build your own rainwater collector by visiting www.virtualpermaculture.com

NOTE: Prioritize slope over sun exposure and cardinal points.

F3- Accessibility to Water: Where is it the nearest water source? Will I have to transport water in a watering can or bucket, or can I connect a hose? Is the water drinkable or not?

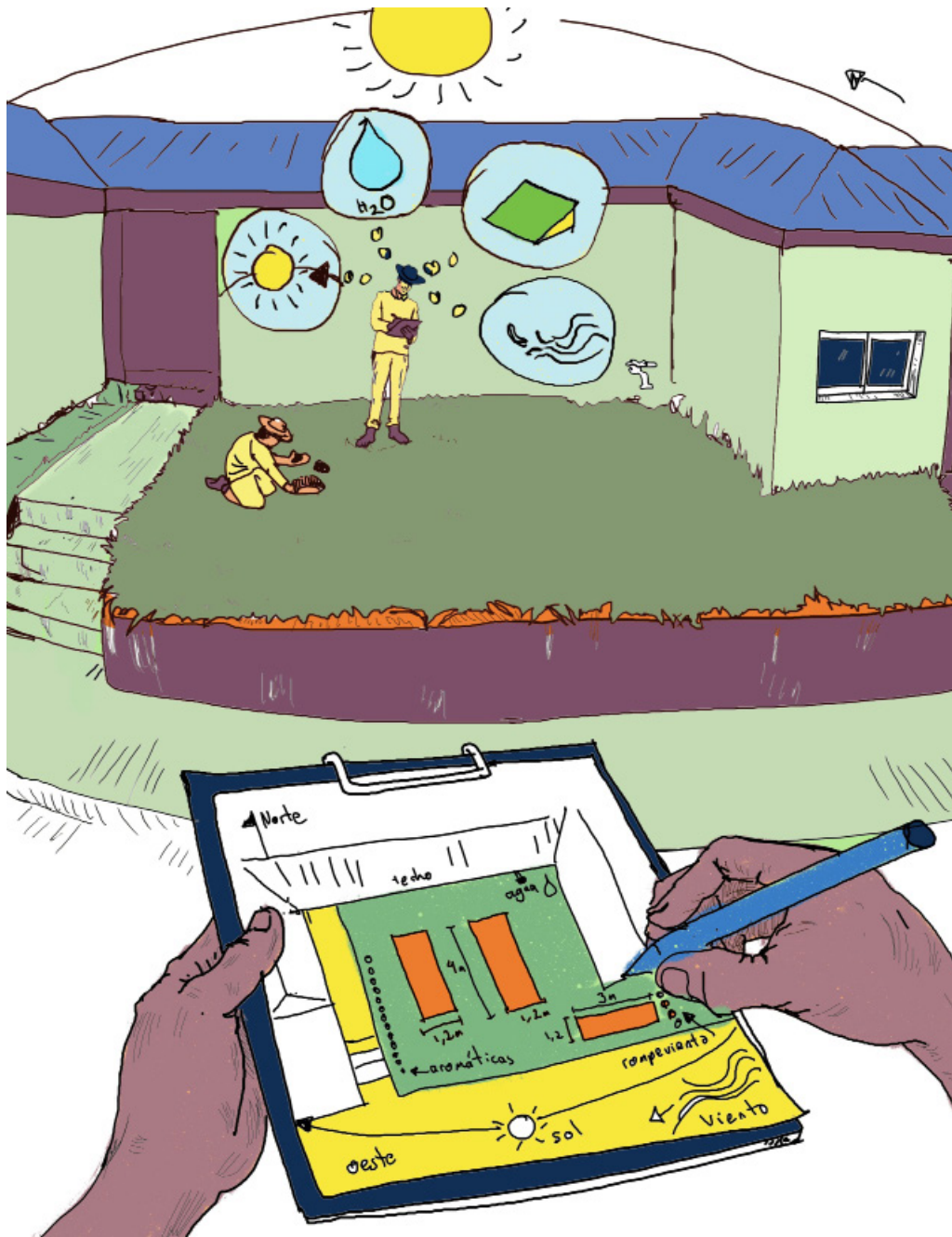
F4- Predominant Wind Direction: This factor tells us where to place barriers, windbreakers, and repellents. You can use plants to make living fences that by giving them maintenance generate inputs for the compost production, and if they have flowers that can be food for birds, bees and other insects, even better! You can place repellent plants so that the wind carries their scent on the crops and thus serves to protect them from some pests. In Costa Rica, in the Central Valley, the wind generally comes from the northeast.

F5- Soil Quality: It is up to us to analyze soil, and the best recommendation is a chemical and biological analysis in a laboratory or a homemade analysis so you can recognize its physical structure and look for it to be neither clayey or sandy. The ideal soil is for it to be loose soil, hopefully with evidence of microorganisms.

F6-Basic Dimensions: The width of the cultivation beds should be between 1 and 1.2 meters, and the length can be adjusted to the space available.

If the bed is going to go next to a wall, we recommend that it have a width of 60 cm for ergonomic reasons (it is the distance average arm length). So you can harvest and work in the garden without needing to lean on the

soil and compact it by accident, the corridors between the beds need to be at least 50 cm wide. This way you can design your garden making the most of the available urban space and protect your soil.



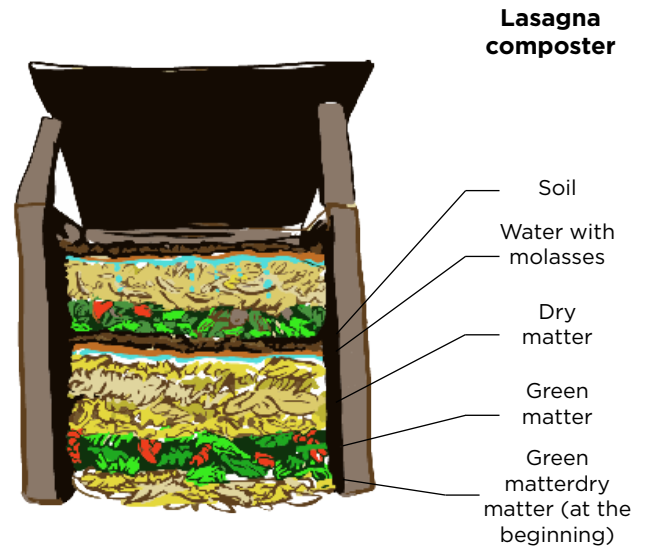
Observe, use all your senses and learn from nature. Nature is the best teacher and will guide you with your design. Record and draw your discoveries, and thus you will obtain the best results in the design of your garden.



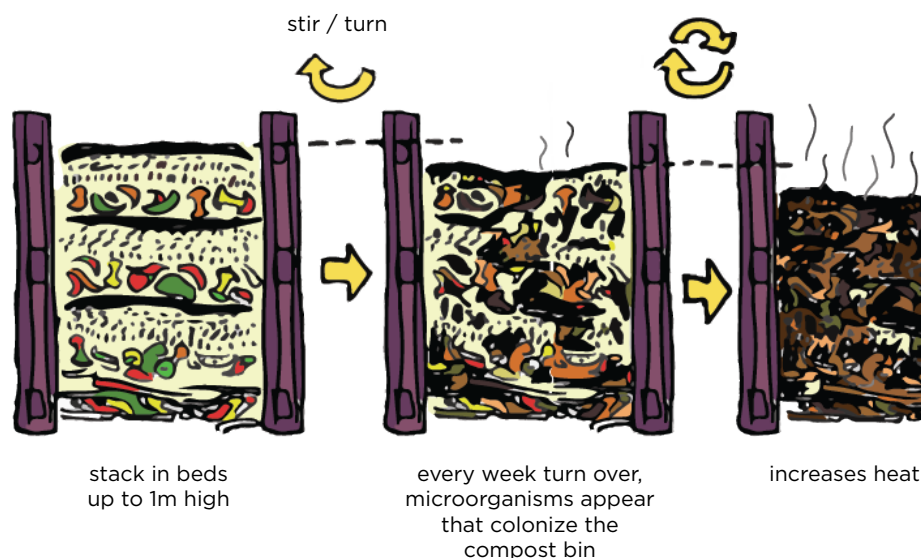
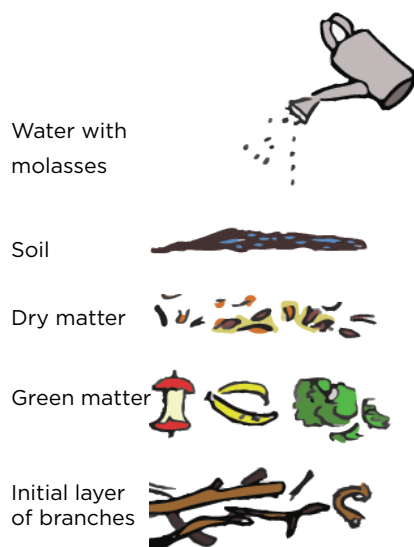
Composting

In this planetary moment in which we must act to reverse global overheating, the soil must be considered a living organism. Through the processes of sowing, growth of plants, roots, fungi and microorganisms work together to give us life, and we collaborate with the fixation of carbon dioxide under the ground, promoting its regeneration. The soil must be nourished and taken care of, and to do so, we must incorporate organic fertilizers into the soil that replace the extraction of nutrients and the losses that occur with use of agrotoxins, erosion, compaction by livestock and poor water design/management.

The production of organic fertilizers is essential for any garden. **It is the food for our food!** Once it is incorporated it returns to the ground, favors the cycling of nutrients, improves its physical, chemical, and biological properties.



Organic fertilizers are the product of decomposition or fermentation of different organic waste. For any technique of compost we use, the ingredients used are classified as follows:



Green Matter: These are all those materials with high contents of available nitrogen or water. For example: fresh prunings from the garden, kitchen waste, fruit peels and other materials that are wet.

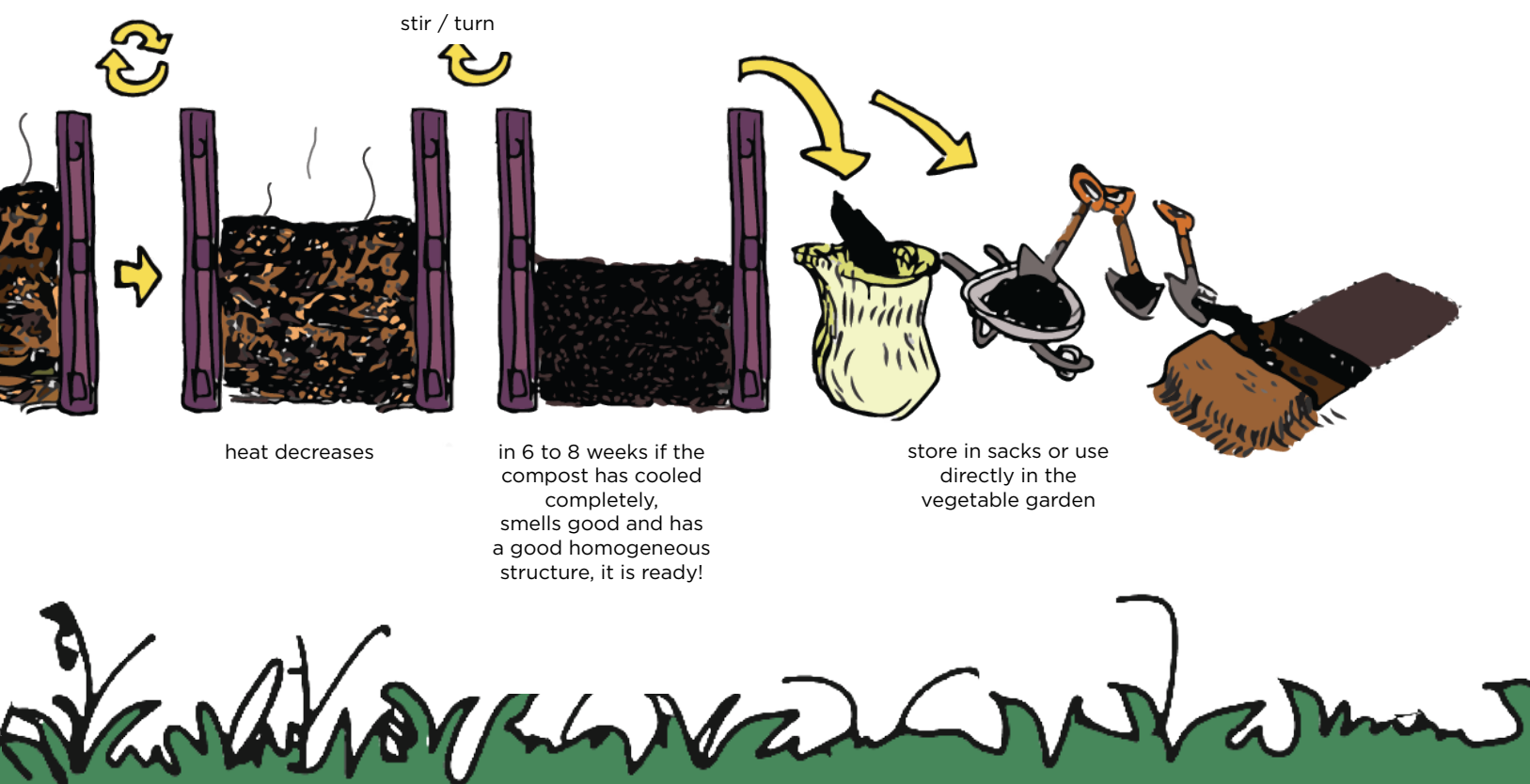
Dry matter materials with high content stable carbon. For example: sawdust, chaff, dry grass, straw, cardboard, paper, leaves of dry trees, egg cartons, etc.

Soil: Microorganisms degrade organic matter, and they will grow and reproduce in the composting process.

Water: As a promoter of relative humidity to keep decomposing microorganisms hydrated and alive. (Keep it composted at an average of 60% humidity, using the fist test).

Extra: Sources of carbohydrates and simple sugars such as molasses, whose function is to feed the decomposing microorganisms present in the composting through high energy content. To accelerate the transformation processes of the materials used, make a mixture of 20% molasses and 80% water (apply with each turning).

The production of organic fertilizers with materials obtained from our own daily activities or from local resources is recommended.





On the next page you will find a guided story that will help you better enjoy this infographic. Find all the numbers in the story!

Community composting in my neighborhood

Roxana (1) and José (2) are neighbors and they share a garden (3). In it the two of them plant everything.

Sometimes, when José cooks (4) he leaves some type of residue (resource) like tuber peels or remains of stems (5), napkins, or egg cartons in the kitchen, so I can take it to a container when he finishes eating.

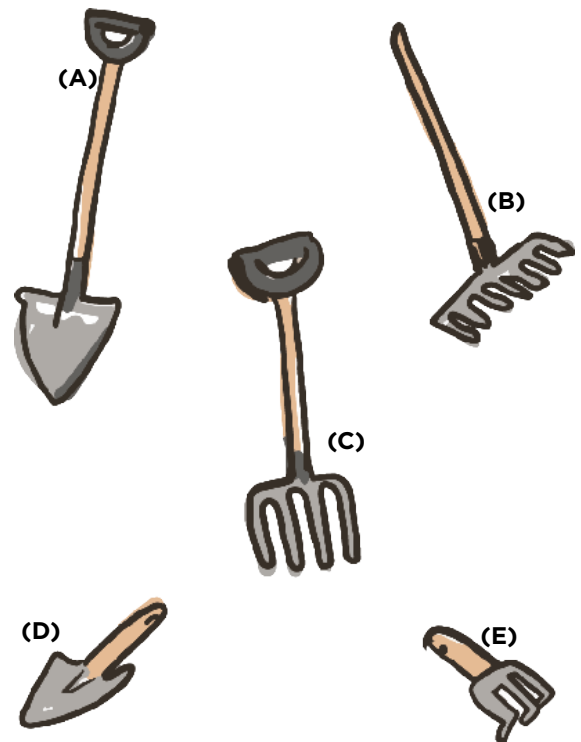
When they prepare their delicious and healthy meals with the garden's harvest, sometimes there are remains of food on their plates after eating (6). Roxana and Jose always collect these remains in a container (7) and so they can bring them from the kitchen to the lasagna composter (8) they have near the garden.

In their compost bin, they add the organic waste from the kitchen and prunings from the garden (9) and orchard (10) together with any dry matter that they have available. When Roxana harvests corn, for example, she cooks the kernels, but the rest of the plant (10) she chops with a machete (11) into more small pieces to incorporate them into the compost.

In this way they produce their compost and incorporate it into the land where they grow their food (12), forming a

natural cycle of garden nutrients.

Following their example, we can all feed ourselves and thus regenerate our soils! Working with and not against nature.



Do you know the names of these tools?
Find the solution below, in the grass.



SOLUTION: A: shovel, B: rake, C: pitchfork, D: shovel or spade, E: rake of

Lasagna technique

This technique is the simplest and most general recipe for compost. To start your project you have to get the ingredients and materials (wooden pallets, pallets, logs, wood, or plastic boxes or other containers that allow) to build a space and structure for composting.

STEP 1: Locate thick branches or trunks in the first layer (in the background) to promote drainage of water and prevent water from pooling which can generate bad smells. Add a layer of green matter (5-10 cm or whatever you have on hand), soil, and on top of it, dry matter. Add water with molasses or just water to keep the pile moist. Then, add again some green matter, soil, dry matter and repeat as time passes and more waste is collected. Cover to maintain a relative humidity between 40%-70%.

STEP 2: It is recommended to mix the pile every 15 or 30 days. Add water with molasses when you mix the pile. Depending on how quickly you want to harvest the product you

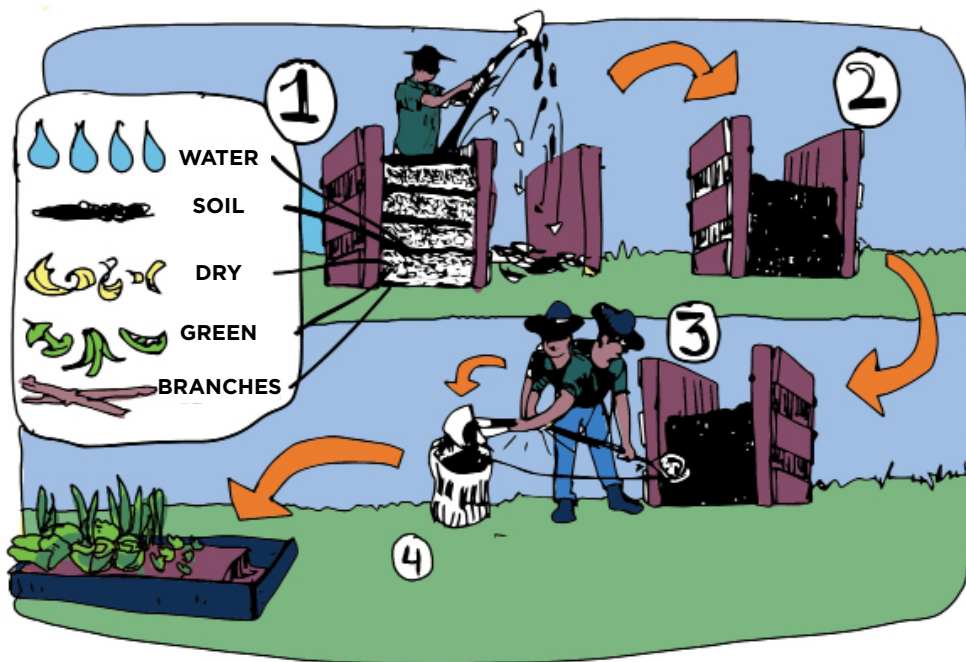
will have to turn more and allow more oxygen to enter so that microorganisms can do their job of decomposition and fermentation faster (wait 2 days minimum between each mixing).

STEP 3: Between 1-2 months it can be ready. The time for compost harvesting will depend on the turning frequency, the size of the ingredients, the climate, and the humidity (among other factors).

If you never turn it over (which is also valid), in San José (Central Valley of Costa Rica) it normally takes 7-9 months to be ready.

To confirm that it is ready you have to make sure that you cannot recognize the different separate ingredients, and observe how homogenized the soil is.

STEP 4: Bag the excess compost to save for when it is necessary to use in your garden, or incorporate it directly to the ground to sow when preparing a new bed or replanting.



Tombola technique

The double chamber rotary composter works so that while the CHAMBER A is filling, CHAMBER B is rotating, turning and maturing. You can get or build the compost bin and get the green and dry materials for combine. Regularly, in a house of 3-5 people who are used to eating healthy, and produce many leftovers of vegetables and fruits, the chamber fills up in about a month.

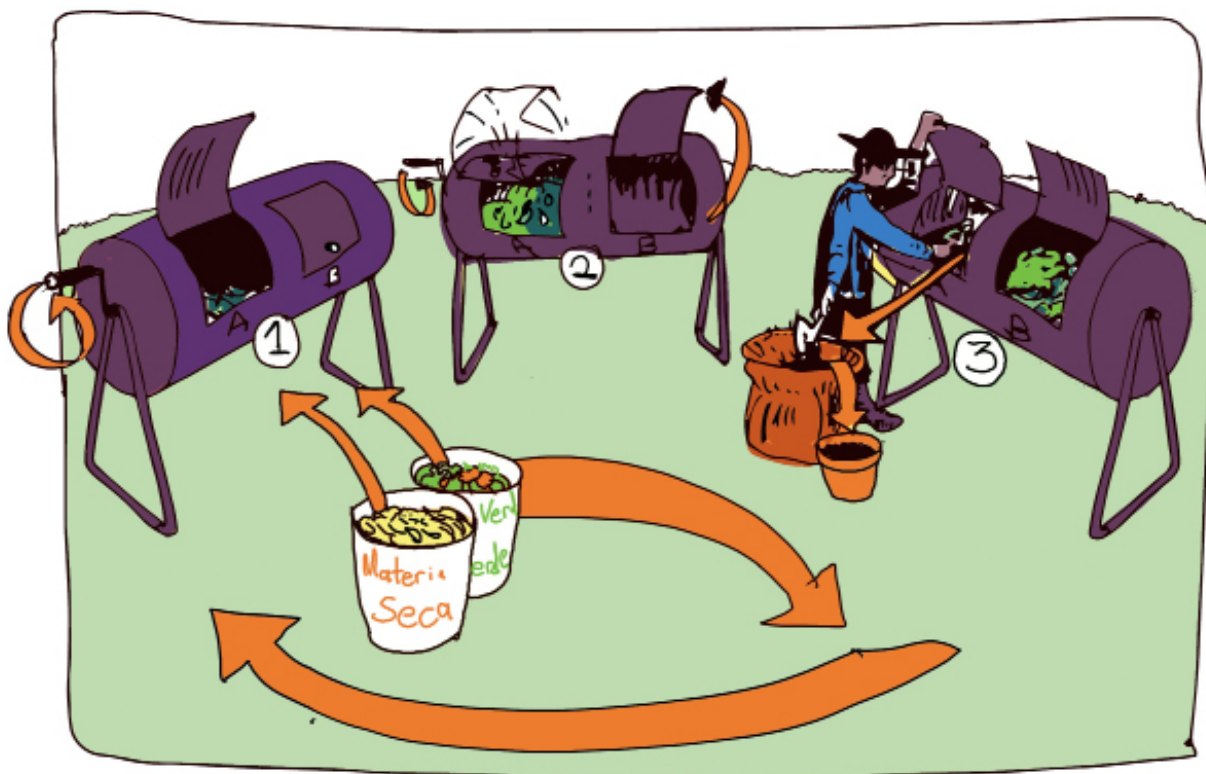
STEP 1: Bring from the kitchen in a container, green materials (waste kitchen). Fill CHAMBER A (which is active) with kitchen waste and dry matter (such as wood pellets, cardboard pieces or other dry items).

STEP 2: When CHAMBER A is full, start filling CHAMBER B.

STEP 3: When CHAMBER B is full, we proceed to harvest what is in CHAMBER A. The harvest is put in a dry place or reintroduced to the soil of the cultivation beds with the double dug

method. Then we start the cycle again, that is, when one chamber fills we harvest the other (which has been maturing for a long time, without adding anything) and we start to fill it.

Note: This is a very simple technique, and it seems more complex than it is in reality. Remember that you can build it, look for some of the companies that sell them and/or find out if your local municipality has any composting program through which you can acquire it.



Vermicompost technique

A vermicomposter must meet some conditions to function optimally:

- Maintain an average humidity of 70- 80%. If necessary, moisten with water without chlorine.
- Maintain the temperature: 20-25 °C (Must be located in a covered place and under the shade. No direct sunlight and must have a lid)
- Maintain good oxygenation: avoid compaction and excess water.
- Get started with 1 kg of worm California red (*Eisenia foetida*). These worms have mouths but no teeth, are hermaphrodites, and in 1 year (with ideal conditions) each worm can produce 1500 new worms
- When you fill one of the sides, harvest (every 4-5 months) through the technique of trapping: feeding is stopped for 10 days. Then in the center, a sieve is placed and on the other hand, new food is added. They are going to move over the sieve, and once they are there, you remove them from the site and harvest yourself compost and put it to dry. Be careful with ants, birds, rats, and other unwanted urban animals!
- For home use, you need to build or get a container to raise them. It can be half a 250 liter can or a drawer with similar dimensions. You can also use two buckets of 25 liters, one on top of the other. Any of the techniques have to have a cover that does not fill with rain, as well as a drainage (hopefully the structure has a slope) so that the worm leachates drain and can also

be harvested in a jar or gallon (see symbol A in the infographic on page 19). This leachate can be used as liquid fertilizer to apply on the leaves of the crops.

Note: Vermicompost is one of the best types of compost, since it is going through the digestive system of worms, and homogenizes and nutritionally enriches the final product. Below, we share information for you to learn how to use a vermicomposter made with tins.

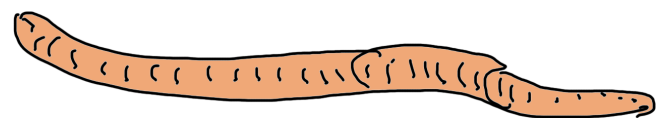
STEP 1: Start placing the organic waste on one side of the system next to the first kilogram of worms.

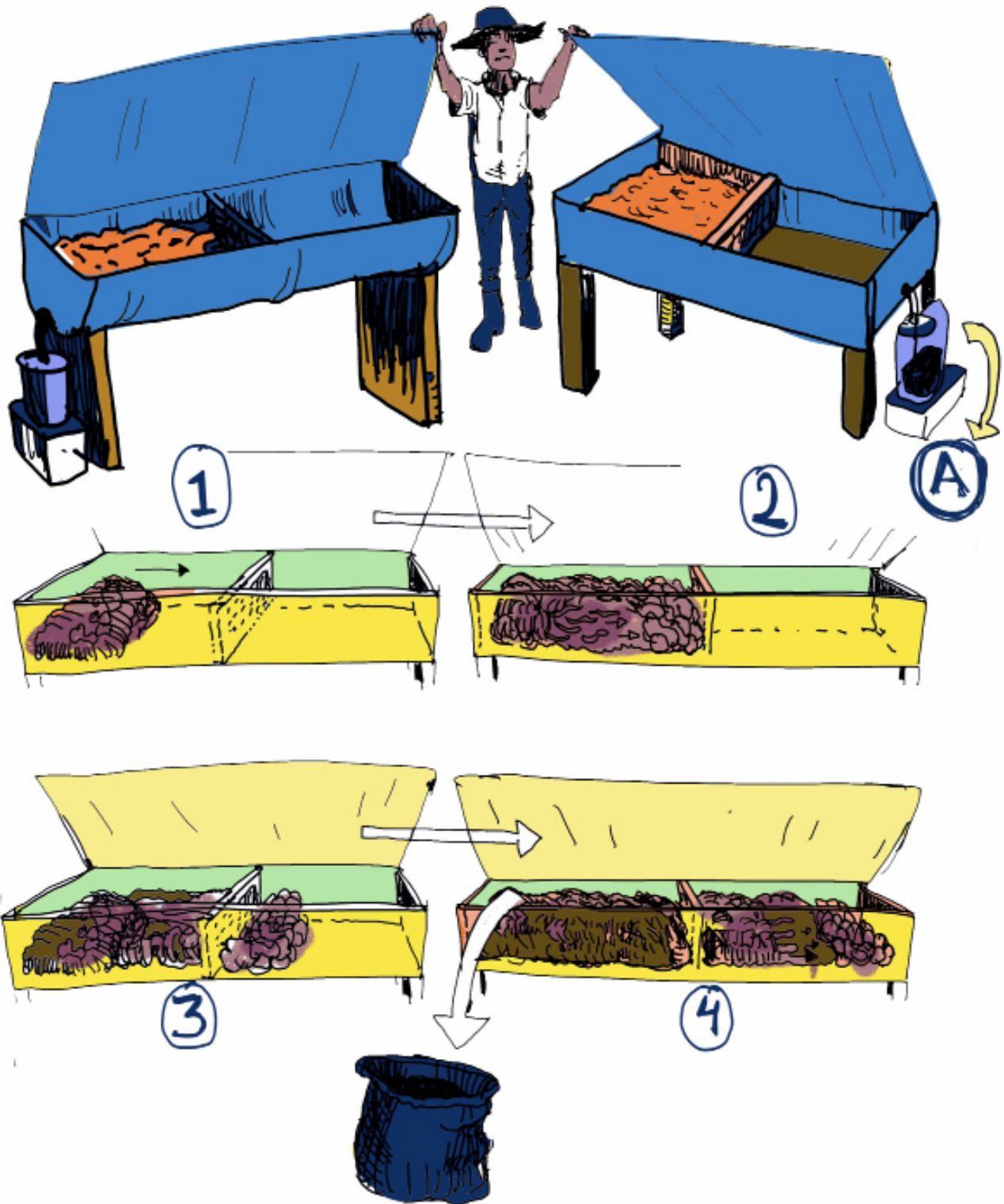
STEP 2: Gradually add waste as if you were making the lasagna layers but horizontally, until reaching the division of the sieve in the center.

STEP 3: Leave at least 10 days without feeding the worms. At this point, add waste fresh on the other side of the sieve.

STEP 4: After at least 21 days of having put the waste in the second chamber, you can harvest the compost from the first compartment.

Note: remember to always keep it moist, adding water when needed.





Construction of a growing bed

Now that you have the design of your garden and you learned the basics and some composting techniques, we invite you to build your first growing bed. We will guide you with the steps to do it.

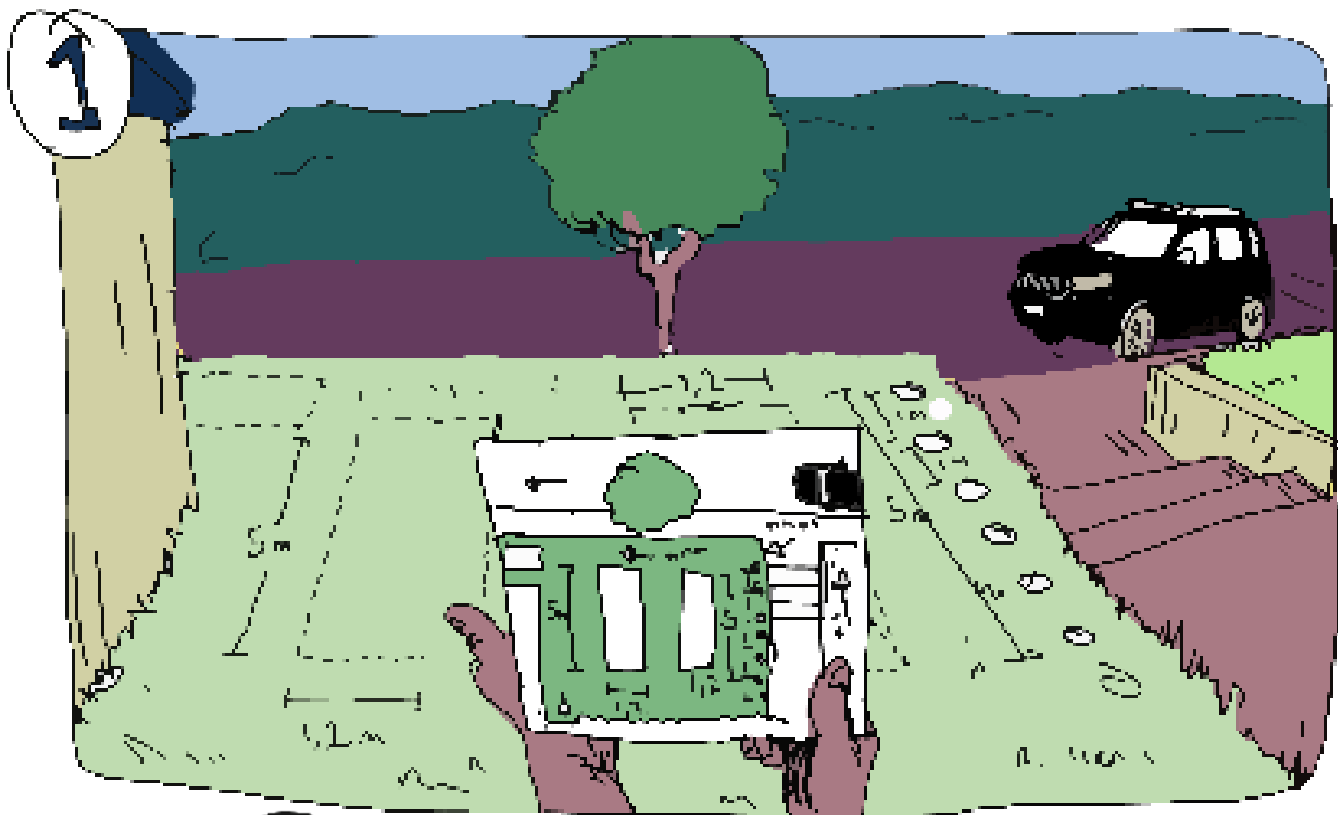
STEP 1: With the sketch in hand, visualize the design reviewing the details and measurements.

STEP 2: With stakes, hammer and tape measure, mark the corners of the future bed.

Have you heard the term growing bed?

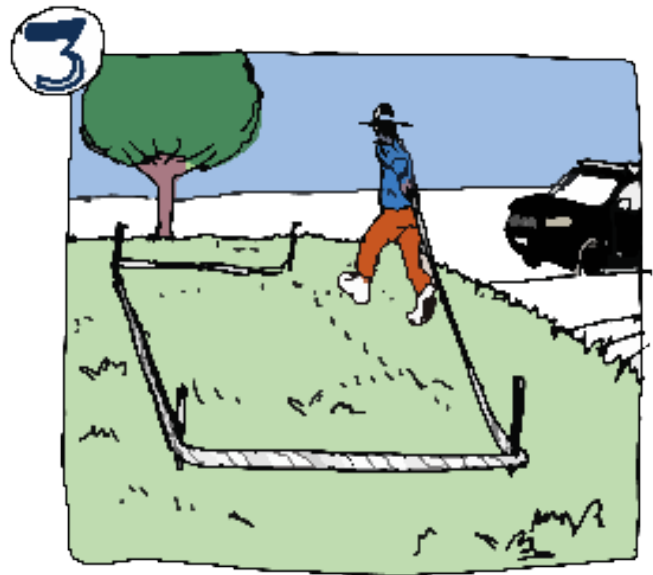


Growing beds are spaces that are used to produce auto species consumption. They can be square or rectangular (depending on the available area and are delimited by edges either made of wood, bamboo, stone, plastic or others).





STEP 3: Use a rope to demarcate the transit areas and cultivation areas, so that the participants can guide themselves for the work of weeding.



STEP 4: Within the demarcated area, using a hoe and with a straight back (to ensure good posture), remove grass with roots about ± 7 cm deep.

To build more than one bed, repeat the same steps. Make sure to leave enough space to move between the beds (recommendation for corridors: 50 cm).



Double excavated method

(part of the construction of the growing bed)

Now that your growing bed(s) are demarcated, you can continue with the application of the double dig method, this will help you grow stronger, healthier plants organic. Before reading step by step, give yourself time to look carefully at the illustration found on the next page. This exercise will help you understand the reading better.

STEP 5: Visualize rows to make double excavations. Each row is 30 cm wide, 30 cm deep, by 1.2 meters (the width of bed).

STEP 6: First excavated row AI: Place a table on row BI, this is done to prevent soil compaction, while, with a pick and shovel, you can loosen the soil from the row AI. When it is loose, transfer it to the cart.

STEP 7: Put a layer of compost on the bottom of the trench, on row AI.

STEP 8: Second excavated row AII: With the pickaxe or fork, decompact and incorporate compost to row AII. The land of this row You don't have to move it, you just have to. You have to loosen it right there at a depth of 30 cm.

STEP 9: First excavated row BI: Move the board one row back over the row CI, decompact the soil in row BI, and pass it where row AI used to be, while you incorporate compost.

STEP 10: Add compost to the bottom, on row CI. Repeat step 8, doing the cycle of the second excavated in row BII and so

successively, repeating the cycle until you get to the end of the bed and make the second excavated in row GII.

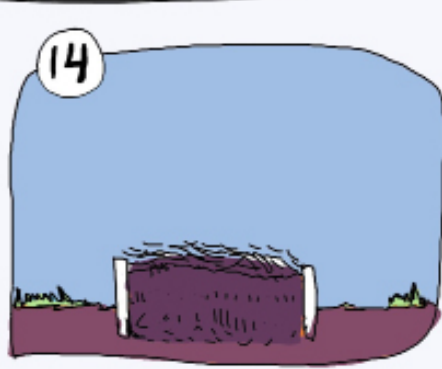
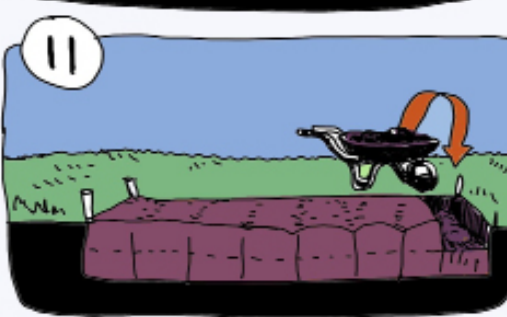
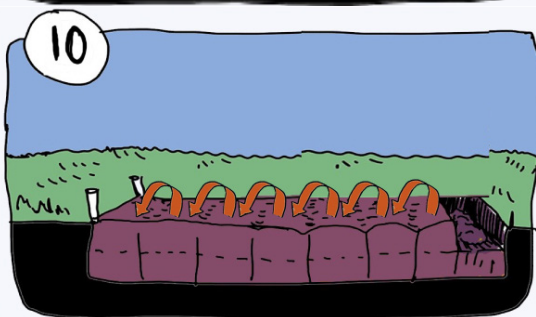
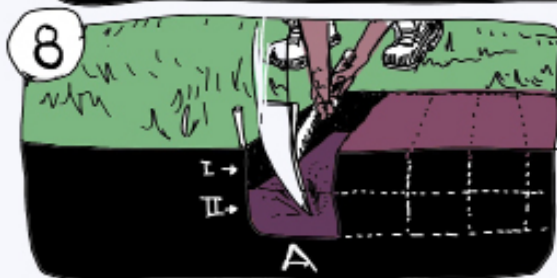
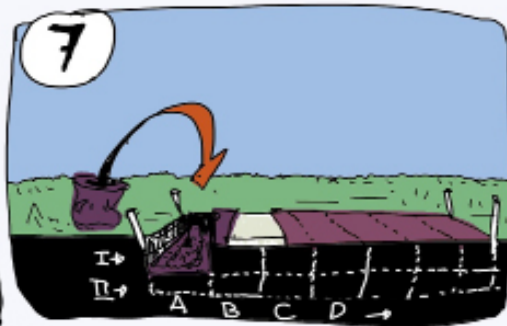
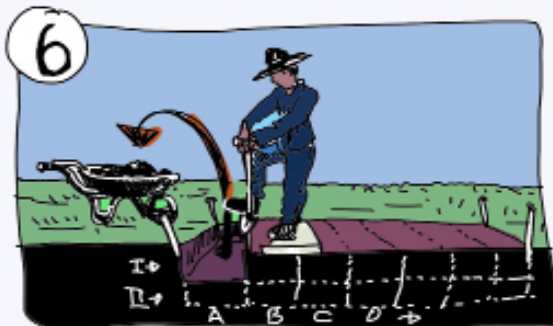
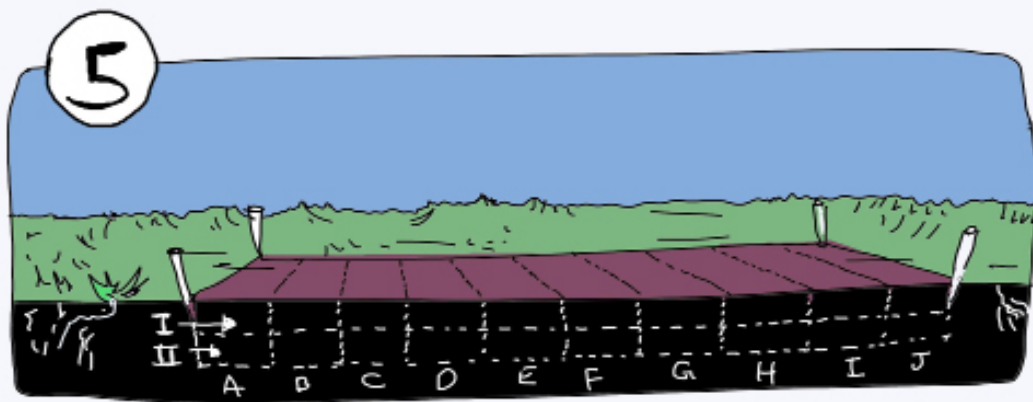
STEP 11: Fill the empty space in the row GI with the soil you have in the wheelbarrow (the one you took from row AI).

STEP 12: As you already did the double excavation all over the bed, now you have to make a hill of earth in the center of the bed and place wood, stone or bamboo on the edges.

STEP 13: Once you have installed the edges, you can flatten the bed (eliminating the hill of earth and distributing it throughout the bed).

STEP 14: Place the plant coverage, this will help you suppress weeds, prevent rain and water from compacting the soil, avoid evaporation, increase the biodiversity of the soil layer, and prevent soil erosion.





Bed planting

For the development of this chapter we will base ourselves in 3 basic principles of the biointensive method:

1. **Close Sowing**
2. **Crop association**
3. **Crop rotation**

Principle of CLOSE SOWING:

This principle is dependent on having performed an optimal double excavation and incorporating compost into the soil is a way to arrange the plants in your bed in such a way so that you can fit 4 times more plants than those that you can plant with other techniques. This is performed with the staggered technique (or staggered leg) rooster) which consists of sowing the plants specific distances depending on size that they have when they grow up (see table of distances and sowing types in the following page), taking into account that once it reaches its final size, its leaves must touch. To perform the quincunx, we can help ourselves to a wand or branch of the desired size.

Here we share a description of the steps:

Step 1- Taking the edge of the bed as a line guide, make holes at the distance that the wand.

Step 2- Taking as axis the first hole of the guideline, rotate the branch to check that the

first hole of the second line is one distance branch for both the first and for the second hole on the guideline.

Step 3- From this first hole of the second line, again make marks taking the stick as a measure, checking each time that the marks of the line below, are located a rod away. I repeated these steps until mark the entire bed, taking into account the quantity and distance required by each crop.

Note: There are several ways to plant our crops, but in general we can talk direct sowing (refers to placing the seed directly into the growing bed) or transplant, (recommended for most vegetables and others used in urban agriculture). In the table you have in the following page you will find the “T” symbol for transplant plants from the seedbed, and “D” for those of direct sowing.

Planting distance is essential in saving space and maintaining energy. In the left image of the next page, the triangles are approximately 25 cm (distance diameter needed by the lettuces). You can see how between them “there is left over,” an empty space in the center of the triangle, which we can take advantage of to put in a plant like chives (see image right).

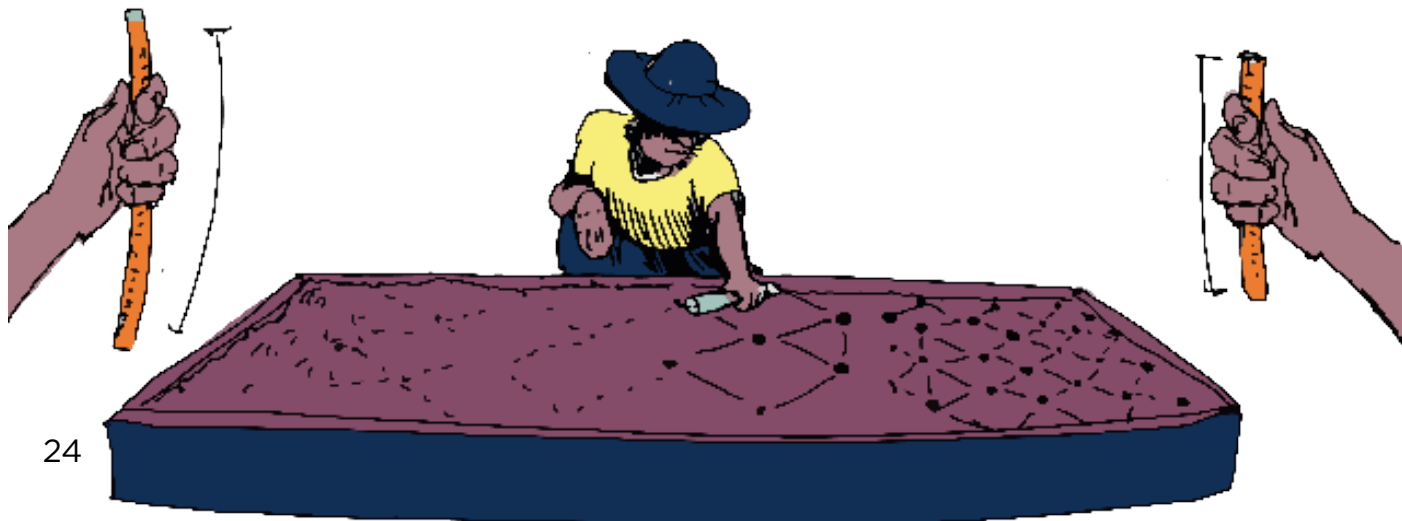
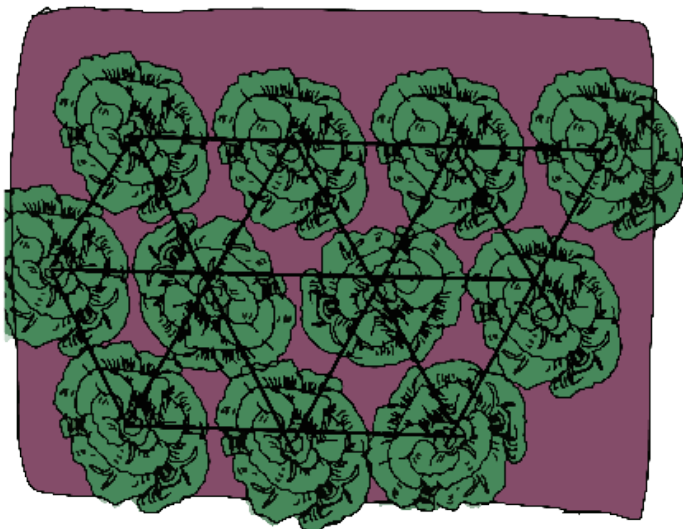


TABLE OF DISTANCES AND TYPE OF SOWING

Crop	Distance (cm)	Direct Transplant	Crop	Distance (cm)	Direct Transplant
Chard	20	T	Broad beans	20	D
Garlic	10	D	Chickpea	10	TD
Sesame	20	TD	Sunflower	23/61	D
Amaranth	30/40	TD	Kale	40	T
Rice	10	D	Lettuce	30	T
Beets	10	T	Lentil	10	D
Broccoli	38	T	Corn	50	D
Peanut	23	D	Melon	38	TD
Pumpkins (curcubitaceae)	46/76	TD	Turnip	10	T
Sweet potato	15/23	D	Okra	30	TD
Barley and rye	13	TD	Potatoes	30	D
Common onion	10	T	Cucumber	30	T
Onion of tail	7.5	T	Parsley	13	T
Peppers	40/50	T	Sweet Pepper	30	T
Cabbage	38	T	Quinoa	30	T
Brussels sprouts	45	T	Radishes	5	D
Cauliflower	38	T	Soy	15	D
Spinach	15	T	Tomato	50/60	T
Bean	15	D	Tatsoi	30	T
Celery	30	T	Wheat	13	D
Eggplant	40	T	Carrot	8	D



CROP PARTNERSHIP PRINCIPLE:

The crop partnership principle consists of the type relationships that have two or more floors to benefit each other. This is the fourth principle of the Biointensive Method, it is complex to explain, but we can make an analogy with what happens to human beings... think about when you meet neighbors or people you get along with easily and they even become your friends. And then there are other people and, for some reason, you cannot live together peacefully. Even if there is a complicated relationship, that does not mean that these people are "bad," but we simply do not make a good complement. Something similar happens in plants. There are plants that do not get along with others, and there are some that work very well in teams.

One of the most common Latin American examples is the planting of the cornfield, where we planted corn, beans and some pumpkin together. Thus the corn planted first begins to grow, in the third week we planted a climbing bean, and on one side an ayotera. This way the corn gives the structure to the bean to grow, the bean fixes nitrogen to the soil, which is food for corn and cucurbits, and squash covers the soil, preventing evaporation of the water. Below we share a table with some examples of associations of crops that you can implement.

Crop Association Chart		
Plant	Related Plant	Antagonist Plant
Basil	Tomato, sweet chili bell pepper, asparagus	Rue, Sage
Celery	Leek, tomato, pole beans, cauliflower, eggplant, broccoli, cabbage, kale	Potato
Eggplant	Beans, cauliflower, broccoli, lettuce, chard, leek, parsley, radishes, celery, spinach, cabbage, kale, etc.	Fennel, cucumber
Onion, garlic	Strawberry, tomato, lettuce, scattered chamomile, eggplant, chard, carrot, beets	Beans, cauliflower, broccoli, cabbage, leek, kale
Chives	Carrot	Beans
Cabbage (Kales, broccoli, cabbage)	Aromatic plants, celery, dill, chamomile, rosemary, mint, onion, eggplant, beans, spinach, cucumber, lettuce, chard, sweet chili, leeks, radish, tomato.	Strawberry, tomato, climbing bean, potato, garlic
Spinach	Strawberry, eggplant, cauliflower, broccoli, potato, lettuce, radish, tomato, cabbage, kale	
Bean	Potato, carrot, cucumber, cauliflower cabbage, most vegetables and aromatic plants	Onion, garlic, fennel, leeks
Pigeon pea	Potato, cucumber, strawberry corn, celery	Onion

Crop Association Chart

Plant	Related plant	Antagonist plant
Ayote, Pumpkins	Corn, beans (in guild with corn)	They need a lot of space, they generate a lot of shade to the other plants.
Climbing Bean	Corn, ayote	Onion, sunflower
Sunflower	Cucumber	Potato, climbing bean
Lettuce	Carrot and radish (3 together) strawberry, cucumber, onion, garlic, scallion, eggplant, cauliflower, broccoli, leeks, radishes, tomato, zucchini	Parsley
Potato	Beans, corn, eggplant, sweet chili, zucchini	Pumpkin, cucumber, sunflower, tomato, raspberry, cauliflower, broccoli, celery
Corn	Potato, bean, cucumber, ayote	
Cucumber	Bean, corn, radish, sunflower, cauliflower, broccoli, garlic, beet, celery, kale, cabbage	Potatoes, aromatic plants, eggplant, radishes, tomato,
Tomato	Chives, onions, parsley, asparagus, carrots, cauliflower, broccoli, beans, garlic, lettuce, chard, carrots, parsley, leeks, radishes, celery, cabbage, kale, etc.	Potato, fennel, cucumber, cabbage
Radish	Bean, nasturtium, lettuce, eggplant, cauliflower, broccoli, chard, carrot, kale, spinach, celery, etc.	Cucumber
Parsley	Tomato, asparagus	Lettuce
Carrot	Lettuce, chives, leek, onion, rosemary, tomato, garlic, chard, radish, tomato	Dill



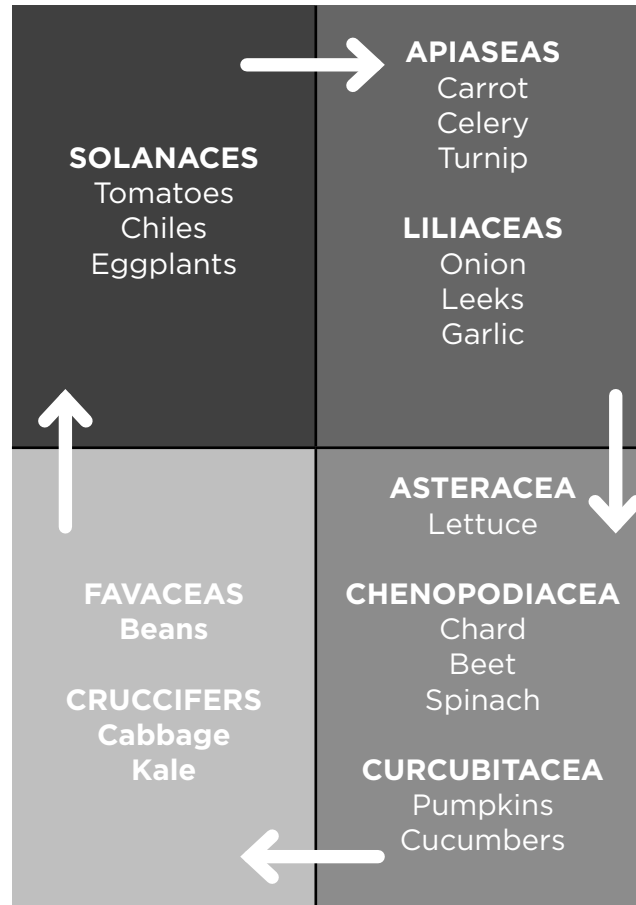
Principle of CROP ROTATION:

One of the main causes of wear on soils is the practice of monoculture (in other words, the constant cultivation of the same plant at the same place). This can happen when the same crop is planted in the same place twice in a row. This is not only because the crops provide or consume specific nutrients from the soil, but because there are also diseases that we can avoid, through rotation. You can take advantage of the seasons as well as the time or cycle of each crop to plan the rotation of your crops, in the following table

You can observe a general pattern that will serve as a guide to find the best rotation favorable between plots, beds or spaces available. You will see that, understanding the plant families you can generalize their nutritional demand in the soil as well as its association of crops.

Note: The earth also needs rest and we can give it rest if we plant plants called light consumers, most of them are roots such as carrot, beet, radish, sweet potato and onion.

Example of rotation:



FAMILY CHART

SOLANACEAE	LILIÁCEAE	CONVULVUNACEAE	FABACEAS (legumi- nosas)
Tomato, potato, eggplant, cape gooseberry, chili bell pepper, queen of the night, tobacco	Onion, garlic, scallion, leek, garlic grass	Swwet potato, churristate	Pigeon pea, climbing beans, alfalfa, broad beans, peanuts, vanicas...
APIASEAS	ASTERACEAE (compositae)	EUPHORBIACEAE	CRUCIFERAS (brasicas)
Celery, carrot, parsley, cilantro, arracache	Lettuce, sunflower, chicory, endive.	Cassava	Cabbage, cauliflower, broccoli, kale, cabbage, radish, turnip
GRAMINEAS	PIPERACEAE	CURCUBITACEAS	MALVACEAE
Corn, abda lay, rice, wheat, barley, oats, St. Peter's tears, lemon grass, bamboo.	Black pepper	Melon, watermelon, cucumber, squash, zucchini	Okra, hibiscus flower, hibiscus flower, poppies
ARACEAE	AMARANTACEA	LAMIACEAE	CHENOPODIOIDEAE
Tiquisque, ñampi, malanga	Amaranth	Mint, oregano, rosemary, thyme	Swiss chard, beets, spinach



Homemade supplies

As a complement to all the learning you have accumulated so far, we want to share with you a couple of recipes to make homemade bio inputs. One for pest control and another that works as fertilizer. Enjoy them!

Extract for pest control

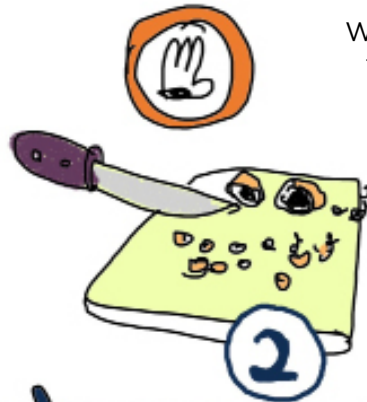
You need:



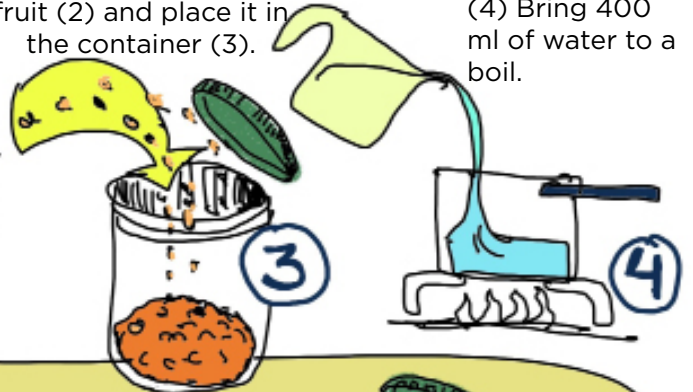
(1) Weigh the Panamanian chili



Wearing gloves, chop the fruit (2) and place it in the container (3).



(4) Bring 400 ml of water to a boil.



(5) Bring the water to a boil and transfer it to the container containing the chopped chili (6)

(7) Let stand for 24 hours.



(8) Filter the mixture

(9) Bottle and label. Remember to write down: DO NOT DRINK, the date of elaboration and the recipe

To use it, you have to dilute 5% of the extract in 95% of water.

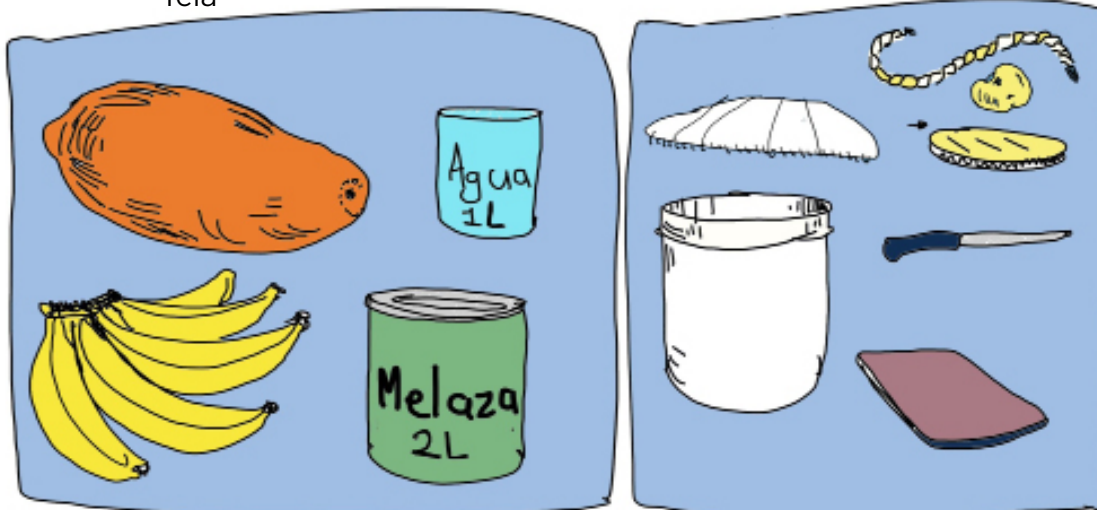


Fruit BIOfertilizer

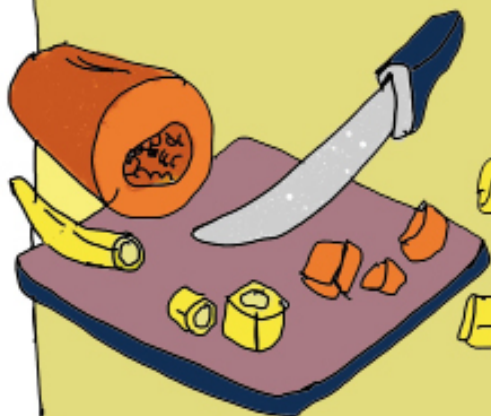
You need:

- 1L of water
- 2L molasses
- Bananas
- Papaya
- 5 gallon container
- Tela

- Rope
- Stone
- Cardboard
- Knife
- Chopping board



STEP 1: Chop all the fruit.



STEP 2: Previously, mix the water and molasses. Add this mixture over the chopped



STEP 3: Place the cardboard on top of the mixture and the stone on top of the cardboard to prevent them from floating. Cover with the cloth and tie the cloth with the rope.



STEP 4: Let the mixture stand for 15 days and then filter.



STEP 5: Bottle and label. Remember to write on the label: DO NOT DRINK, the date of elaboration and the recipe used.



To use it, I diluted 5% extract in 95% water.

Extract for pest control

APICHI (garlic, black pepper and pepper)

This recipe is the alcoholic extract version of APICHI (garlic, pepper and chili) and works as an insecticide or biological repellent against aphids, bedbugs and whiteflies (some of the most frequent pests in our gardens).

Look for the following ingredients and materials and you will be ready to start your own biological repellent.

Ingredients

(for a 500 ml. preparation):

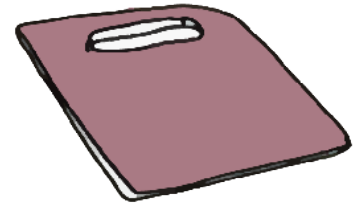
- 500 gr garlic
- 100 gr black pepper
- 500 gr pepper
- 500 ml 90° alcohol

Materials:



Gloves

Chopping Board
(or blender)



Knife and 1 glass bottle
of 500 ml or more

Weight scale



Procedure:

1. First you have to mince or blend the garlic, pepper and chili.
2. When they are chopped or liquefied, put them in the glass container and add the 500 ml of alcohol.
3. Mix and leave it in the shade for 7 days.
4. Find a cloth and filter the mixture, then keep it in the glass jar.
5. Label the bottle with the name and date of preparation. Store it in a cool place (in the shade).

It is important to know that this mixture expires after 6 months, so try to use it before that time!

How to use it?

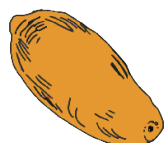
Dissolve 5 ml in 1 liter of water. Apply it twice a week early in the morning or in the late afternoon.

Liquid fruit fertilizer

This second recipe will help you to nourish your crops, so that they grow healthier and stronger. To prepare it, you will need the following materials and ingredients:

Ingredients:

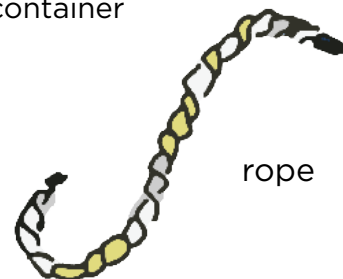
- 1 bunch of bananas
- 1 papaya
- 1 pineapple
- 4 liters of molasses



Materials

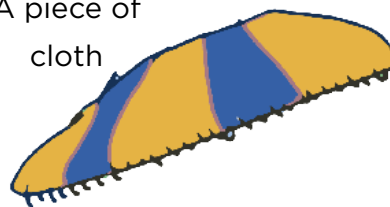


5 liter container



rope

A piece of cloth



stone

Procedure:

1. First you have to chop the fruit into small pieces.
2. Make a bag with the cloth and put a stone at the bottom of the bag.
3. Add the chopped fruit.
4. Put the bag in the 5 liter container and cover it with the molasses.
5. Cover and store for 7 days.
6. After 7 days, remove the bag and squeeze the bag to incorporate the liquid retained in the bag to the rest of the fertilizer.

How to use it?

For foliar application (on leaves), use 100 ml in 900 ml of water.

For soil irrigation, use 200 ml of fertilizer in 800 ml of water.

Complementary Recipe (aloe vera - aloe vera foliar adherent)

Ingredients :

- 1 aloe vera leaf
- 1 litro of water
- Blender
- Strainer



Procedure:

1. Wash the aloe leaf.
2. Blend the aloe vera (with all and peel) in 1L of water.
3. Strain and that's it!

To apply the adhesive, mix 100 ml of adhesive + 5 ml of APICHI + 895 ml of water. Apply it early in the morning or in the evening in the cooler hours

Maintenance of the Vegetable garden

Comprehensiveness is the way nature works. If you use the tools presented in this manual separately and you omit some, maybe you will have good results, but in one or two seasons the ground nutrients will be depleted. If we stop to think about it, it makes complete sense, since the Biointensive method produces high yields thanks to the combined use of its principles. We recommend being careful, since if you use close planting in a bed without making a double digging and incorporating compost, you will obtain weak and sickly plants and will quickly deplete the soil. For the maintenance of your garden, we invite you to follow the following steps:

1. Preparation of Compost: next to this principle, depending on the available space, we also recommend planting crops of carbon, that is, plants that feed us and at the same time produce dry material for use in compost. Harvest time will depend on the technique as well as the quantity of turns.

2. Soil preparation: consists of maintaining the soil with the necessary nutrients, doing double digging, incorporating compost and mulch, and respecting the width measurements of the beds.

3. Sowing or resowing: next to sowing nearby we can also buy or prepare our own seedbeds. We can reproduce cuttings or cuttings of plants constantly whether to consume or to sell. You do what is possible by using and rescuing local seeds and open pollinated.

4. Pest control application: There are many homemade recipes that we can investigate. Remember that organic agriculture promotes preventive applications and constant, avoiding the appearance of pests or diseases and then working on them or curing them.

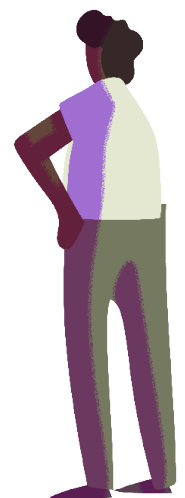
5. Fertilization: can be applied with inputs homemade on the leaves or incorporating compost to the ground right in the place where we are going to sow during double digging.

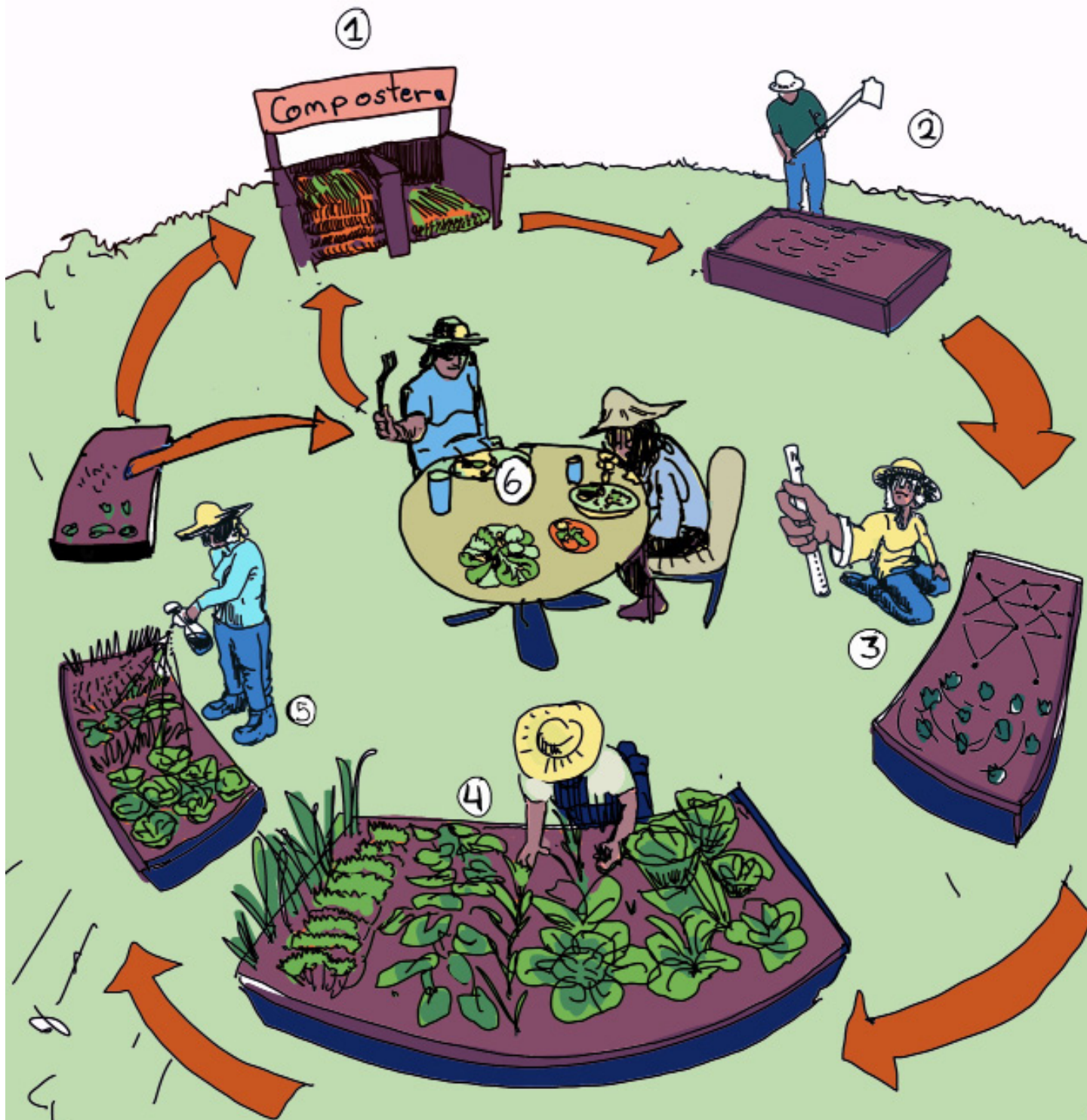
6. Weeding: by applying plant cover we suppress the growth of many of the unwanted weeds, but we must take advantage when they are germinating to eliminate them because at this moment its roots have not deepened nor have they been reproduced. This will save us a lot of work and wear and tear on our soil.

7. Harvest/celebration: Like the sowing, the harvest must be scheduled. Little by little we will learn to recognize and calculate the times in which crops are ready. We must remember that there are crops such as lettuce, kale, spinach, Chinese mustard, and other leaves that can be left harvesting before the entire plant is list (you just have to choose the most close to the ground, which are the most mature) and this way we don't have to wait to have the 10 lettuces are ready but we can go harvesting little by little, while they grow.

We invite you to promote the transformation through the celebration, when you share your first harvest you will feel the joy of eating what was sown. We invite you to develop your activities as a celebration instead of watching as a task or obligation. It's easier to invite your collaborators to celebrate the composting activity rather than viewing it as homework. The culture developed through celebrations and make it easier assimilate new activities that we will include in our everyday life.

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Veg. Garden Maintenance	
Weekly activities	1,4,5,6 y 7
Monthly activities	2,3 y 7
Annual activities	1,2,3 y 7

**Example of
Maintenance
Activity Planning**

In this image, you can find each of the steps that we describe for maintenance. We invite you to include your neighbors, family and other people who you think can help you work. This project as a whole is much more fun and easier when we work as a team.

Shared things taste better!

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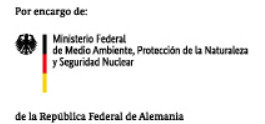


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