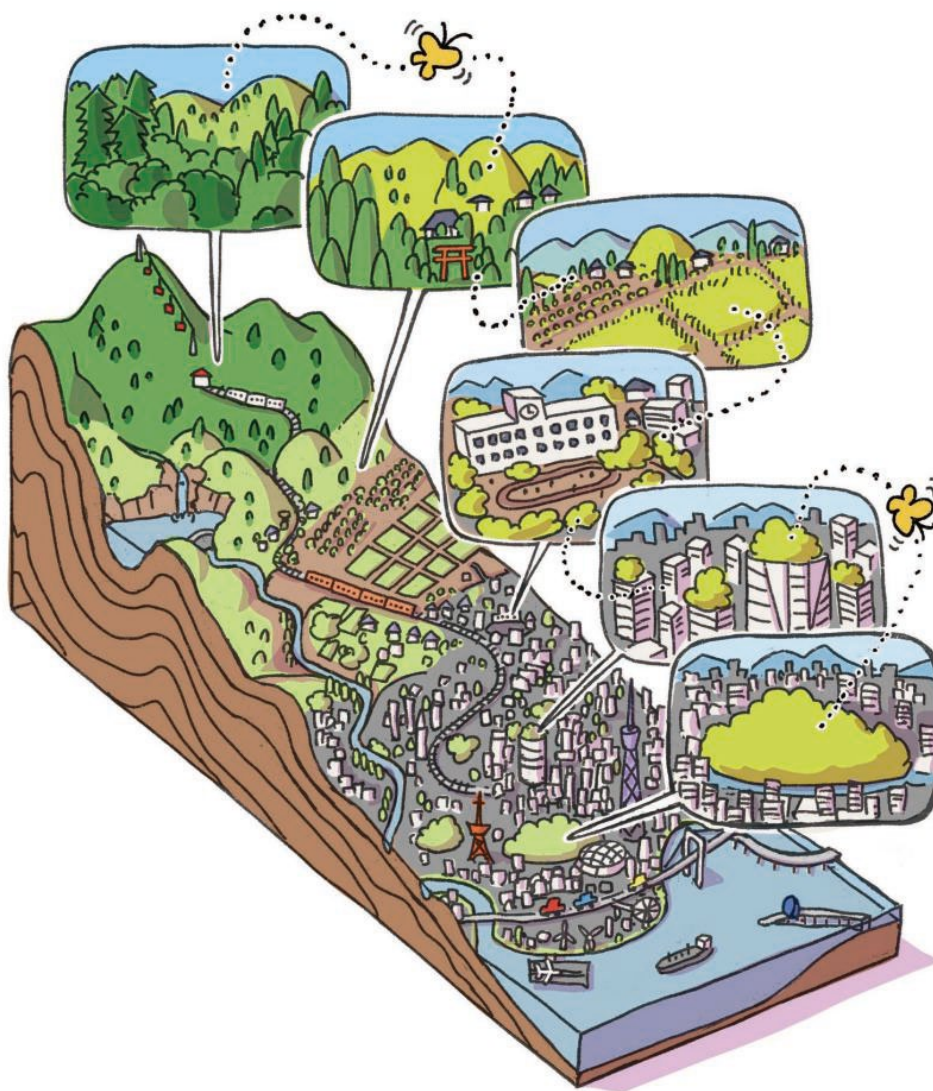


Synecoculture™ Principles Learning Kit

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Sony Computer Science Laboratories, Inc.
Synecoculture Association

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The Microcosm that Extends Under Your Feet

How much of a beneficial role does the soil play, which extends beneath our feet? The layer of topsoil created by plants and animals working in unison has the power to turn rainwater into groundwater, nurture abundant and beneficial microorganisms, and protect us from various diseases.

The healthy topsoil that supports our living is diminishing all over the world. Plants are disappearing, animals have been driven from their natural habitats, fields are turning barren, waterways including rivers and seas are murky, and cities are covered with concrete and asphalt. At the same time, all this destruction has simultaneously clarified what role we should play in the future.

Returning back to breathing soil.

Observing the function of soil, the idea is to build up an abundant cycle of nature in coordination with other plants and animals. To bring back the scent of bountiful nature and the flow of pure water that has supported the breath of so many living things back into our daily lives. We should by all means recreate what has been destroyed. Taking lessons learned from our mistakes and make the future ecosystems even stronger and more plentiful.

The environmental damage caused by the action of human beings over the past 10,000 years since the introduction of agriculture has simultaneously focused our attention on thinking scientifically about the mechanisms of topsoil. Amidst the global biodiversity crisis that we have been facing this century, industries are just now beginning to turn their attention to the soil on which it is based. Why was such an abundance of resources that we could exploit blindly for thousands of years cultivated on land and sea? Why was it necessary for so many lives born on Earth to actively cover its land surface?

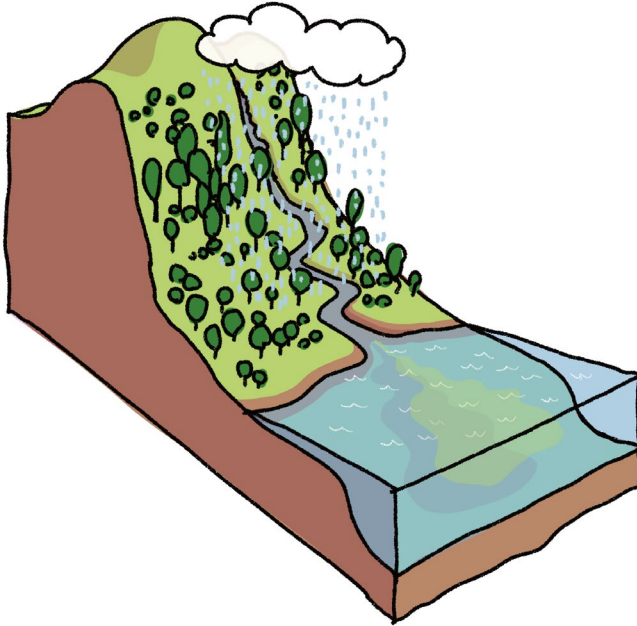
There is a ray of shining hope from the past ten years of research on Synecoculture farming. Humans are capable of building up nature than just merely destroying it. Human beings are the first living species that can go beyond instinct and consciously augment their ecosystem. Making full use of such knowledge, I would like for everyone, everywhere, as living members on Earth, to return to a way of life that contributes to the abundance of our topsoil and ecosystem.

This kit came about from such an aspiration.

Now, please free your mind as you look inside this guide. Listening closely to the voice of the soil with an expanding microcosm at the base of your feet, and slowly feel its touch and warmth. Therein should dwell the unborn child of a future we should create along with the history of plentiful life that has evolved on Earth.

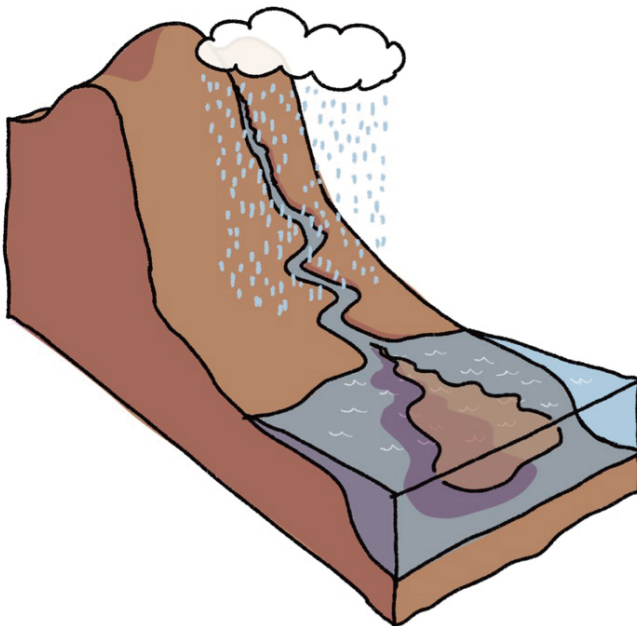
June, 2020 Masatoshi Funabashi

The power of healthy topsoil



Rain falling on land with sufficient vegetation is filtered by topsoil and becomes groundwater with suitable nutrition. The water then pours into the sea, and brings up sea life.

Humans benefit from such well-balanced ecosystem in many different ways.



On the contrary, rain falling on the land where the vegetation has been destroyed washes away the topsoil in the form of mud. It pours into the sea, and ends up harming sea life.

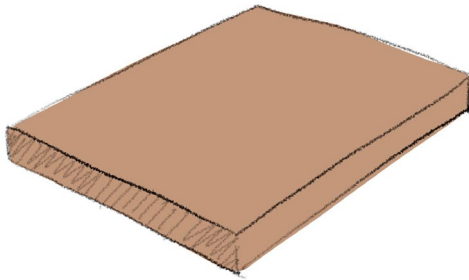
The goal of the Synecoculture principles is to lead to a symbiosis between humans and nature by means of promoting land to recover its topsoil and vegetation.



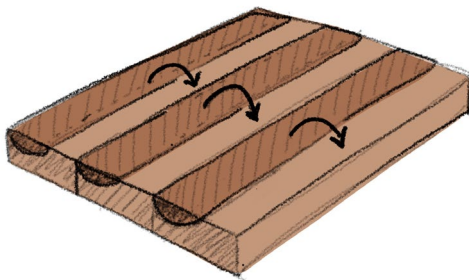
Synecoculture Manual
P.8 Ecosystem services



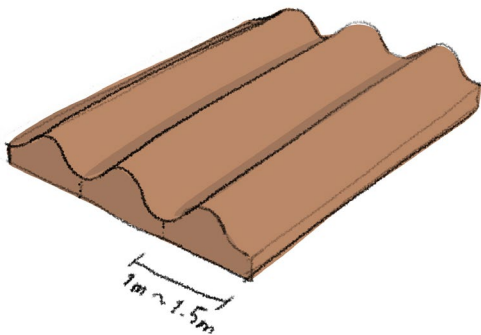
How to recover topsoil on land with damaged vegetation



Suppose there is a land where the vegetation has been destroyed and the soil is exposed.



First, dig out rows at intervals of about 1.5 meters and make ridges. There is no need to plow.

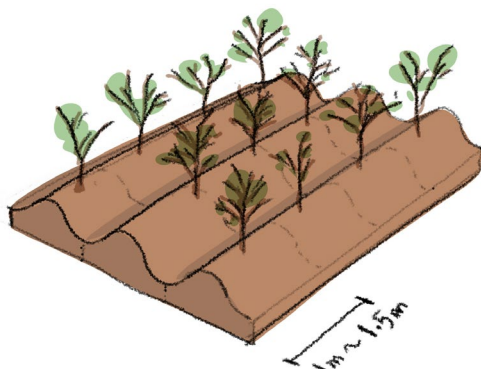


It would look like this.

Plants are just fine without the ridges, but it is convenient to have them as passages for humans.



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P.19 Ridge Building



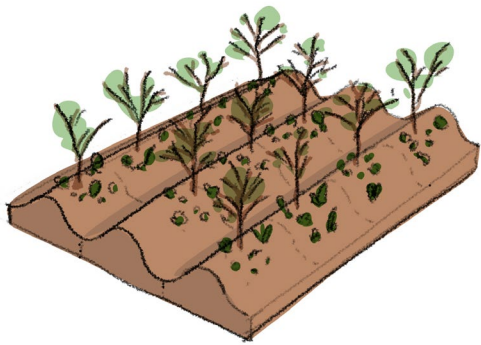
Next, plant 1-2m tall fruit trees at intervals of approximately 1.5m.

The fruit trees will provide semi-shades to the plants that would grow on the ground. Also, they will help nourish the insects and birds that are summoned by the fruits. Leaves will eventually fall in autumn and form mulches. You may even get some fruit.

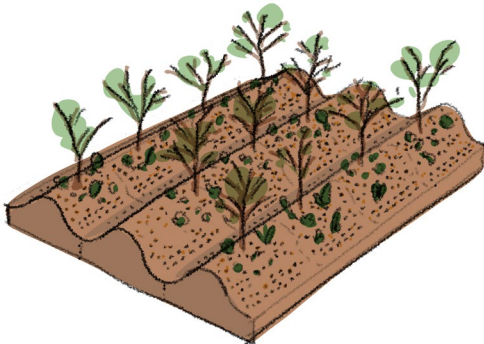


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P.20 Planting Trees

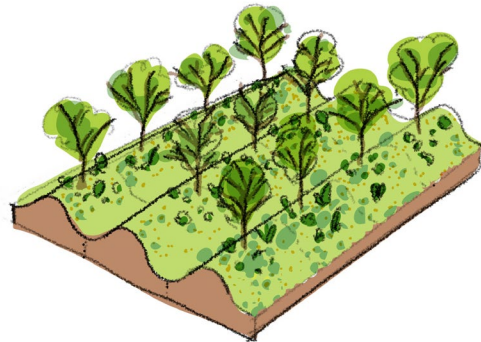




After planting the fruit trees, plant the seedlings. Attention and consideration should be extended to sunshine, shade and sunbeams through the fruit trees. Then sow seeds between these seedlings.



Mix a wide variety of seeds and sow them in high density. Aim for a ground covered as dense and tight as possible with plants and vegetables.



The seeds will germinate and the ground will be covered in green. In case there are plants such as grass originally growing on the ground, the vegetation would recover faster with their help.



We may say that the vegetation has somewhat recovered, once the plant settle in their respective places, and the area begins to look like a small forest. From this state, you can endeavor to manage and improve the soil structure by replacing plants with your favorite ones.

This process, which normally takes a long time to develop in natural ecosystems, can be achieved in a matter of a few years with the help of humans. This is the foundation of the Synecoculture principles, where different species cooperate with each other to build up the mechanism of topsoil.

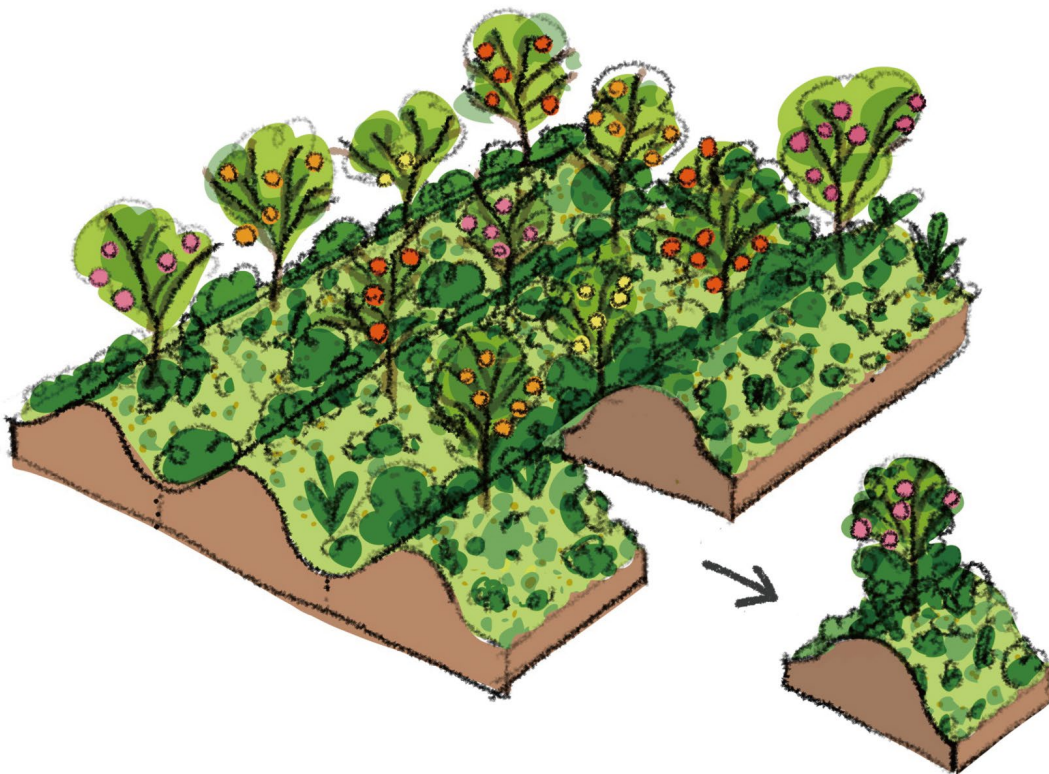


What is the Synecoculture Principles Learning Kit?

A farm based on Synecoculture principles is called a Synecoculture farm. This farm makes good use of a circulatory ecosystem and requires no fertilizers, pesticides or tilling. Introducing such things only leads to a disruption in the self-organized balance of the ecosystem. The harvest is supplemented with plant seedlings and seeds, but nothing else is brought in. The ecosystem is sufficiently self-maintained by the provision of sunlight, rainwater and groundwater, and the action of plants and animals that come to the farm.



Synecoculture Manual
P.7 Defining Synecoculture



The basic unit of this learning kit is the vegetation similar in size to about one fruit tree found on the ridge on this farm. You may not see the ecologically optimized state, but observation of cooperative effects will be possible. You can learn and gain personal experience through rebuilding a healthy topsoil first-hand. Even though it is a kit, there is nothing special needed in starting on your own. You can just use materials already available to you, or even if you are missing something, you could find them at a nearby hardware store or a gardening shop. You can start anywhere as long as you have 4 hours of daily sunlight, sufficient water, air, soil and plants.

Getting started

The open field type



If there is some land available to you, we recommend using it to construct and observe the kit. Are there any weed-filled grassy areas around the proposed site? If yes, then it is probable that the surrounding environment can maintain the ecosystems with only sunlight and rainwater. Otherwise, extra effort to make up for the sunlight and rainwater would be of good learning experience.

The planter type



The planter type is recommended when there is no land available or you want to have it on your veranda etc. A proper amount of watering will be required, because the planter has no access to groundwater. Through the ingenuity of making the planter, you can also receive some benefits that are different from the open field type.

Soil preparation



After finding a suitable site and deciding the diameter...



Dig up the soil and pile it up in the middle.



When a mound is formed, preparations are done.



Prepare a large planter and put stones in the bottom of the pot.



Fill the lower half with low-nutrient red soil.



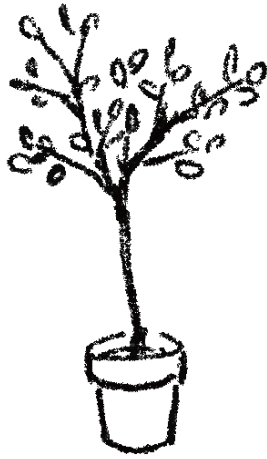
Then fill the upper half with black soil that contains humus.



Raise a mound in the middle of the planter and preparations are done.

Forming a mound creates changes in sunlight and water in the soil, making observation under various conditions possible.

At this point, your soil preparations are complete.
So now let's get ready for the plants!

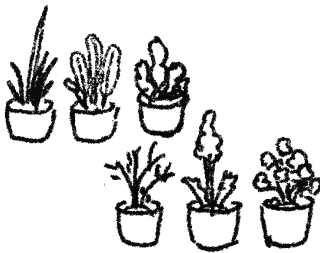


Plants to prepare

In the same way as a Synecoculture farm, you should plant in the order of fruit trees, seedlings and then seeds. It is a good idea to add plants such as ferns, moss and lichen to the learning kit in order to add plant diversity as you find in a natural ecosystem. It is possible to buy plants, receive them from others, or gather them by yourself.

Fruit trees

Plant a fruit tree in the middle. Trees that have falling leaves are probably best at first. When it turns fall, leaves will fall and help nurture the soil. If you go to a nearby hardware store, you can purchase fruit trees that are easy to grow in the same area.



Vegetable and flower seedlings

When planting, the point is to mix as many plants of various shapes and characteristics together as possible. There are many things you gradually learn as you are nurturing plants, so you can start with the ones that you like. The knowledge will come later on. Besides just vegetables, be sure to include things such as flowers and fragrant plants.



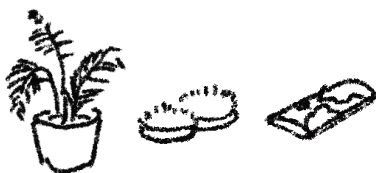
Bulbs and potatoes

Plant them together when planting seedlings. This will create vertical diversity within the topsoil.



Seeds and beans

We recommend that you take seeds from seven or more different types of plant families to mix together and plant. Take a close look at the back of the packages. Some seeds prefer lots of sunlight (light-favored) while others do not (light-inhibited). Mix the light-inhibited seeds together and sow them in lines with soil cover, while scatter the light-favored seeds out evenly over the whole area.



Ferns, moss, and lichens

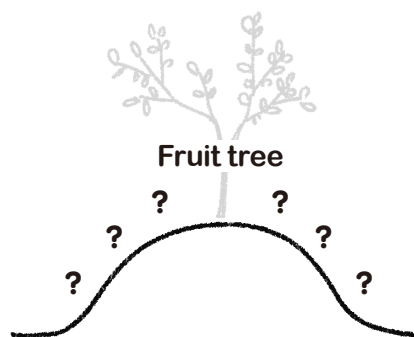
You would not normally bother to plant these in fields or planters, but let's include these in order to increase the diversity of the ecosystem.



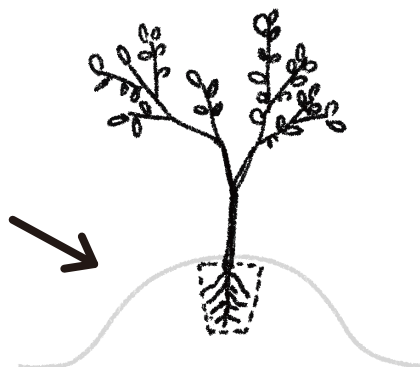
Leaf mulch and cut grass

It is a good idea to place a thin layer of leaves, small branches, and cut grass on top of the soil to simulate natural leaf mold. It's ok however if there aren't any. Leaf mold is generally sold in stores, but grass mulch is not. You can mow and bring back some grass from somewhere in the neighborhood.

First planting method



Centering on the fruit tree, make a plan of where and what to plant. First try to improve your ability to imagine how things will look like by actually placing the plant seedlings on the ground.



Begin planting once you have a plan worked out. Plant the fruit tree first.



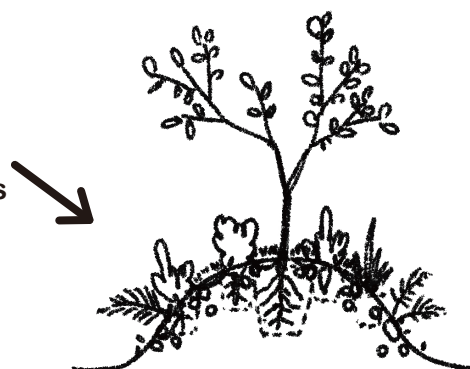
Then plant vegetables and flower seedlings around the fruit tree. You can plant bulbs and potatoes at the same time.



Place moss, ferns and lichens in between the seedlings.



Finally, plant your seeds. Bury seeds that are light-inhibited into the soil, and scatter seeds that are light-favored around the surface.



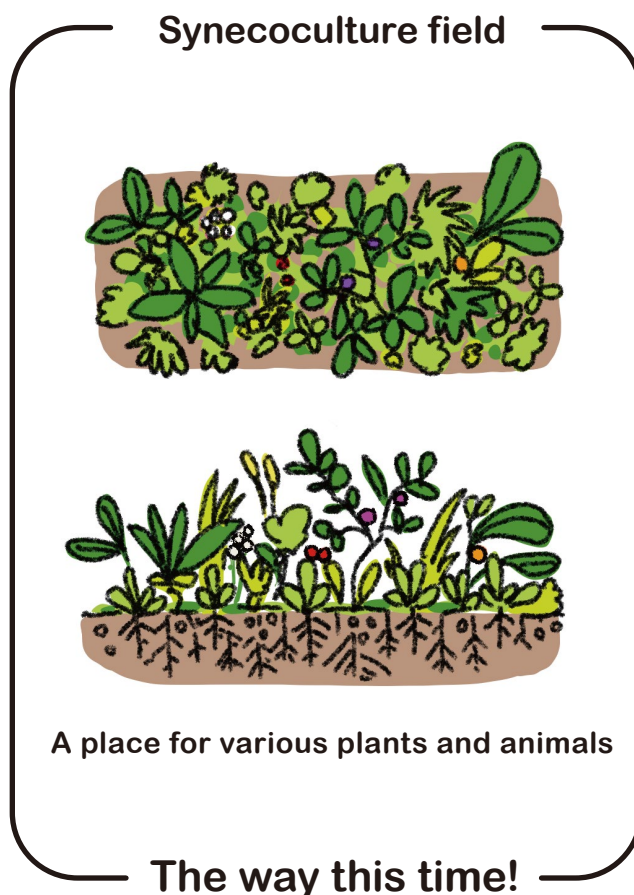
At this point, a small ecosystem connected with the surrounding environment has been established which serves as a base for observing the structure of the topsoil. Because it is desirable to have the surface of the soil covered with organic matter from plants, it is a good idea to first lightly cover up any gaps with leaf mulch or cut grass. However, as plants grow larger, the surface will gradually be covered with plant matter that has withered or been trimmed by hand. So there is no need to worry about that too much, unless you are in an arid environment.

The method of plant propagation is “mixed high density”

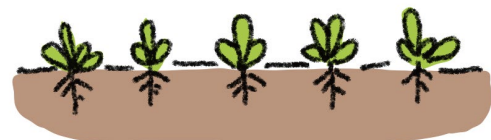
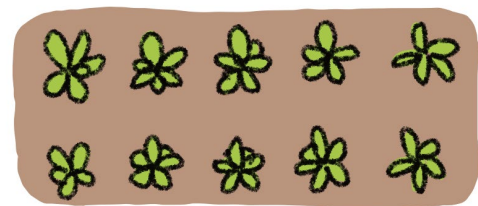
In Synecoculture principles, various kinds of plants are mixed and grown densely packed together, and the area accepts various insects and birds that drop by. This is slightly different from fields where one type of crop is arranged in an orderly fashion. When you plant in this new way for the first time, you may feel uncomfortable with the density and variety, but don't worry and plant away!



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P.15 Vegetation Conditions



A familiar type of field



A place for only one type of crop

Ideally speaking, the soil should barely be visible when seen from overhead. Even when space is very limited, plants negotiate with each another and give one another space so that a balance is gradually established. This is called self-organization, something that is very important in Synecoculture principles.

At first, a relatively large number of plants are needed to get started, but once the ecosystem has been made, it will be enough to simply add whatever plants you like in spaces that open up. Regeneration from fallen seeds are good signs of functioning ecological cycles. Unlike fields that you are used to seeing, you do not need to reset the entire field for every crop harvest.

Some Tips

If you keep the height of your fruit trees within arm's reach, they will be much easy to manage.

The radius of the embankment should also be within reach.

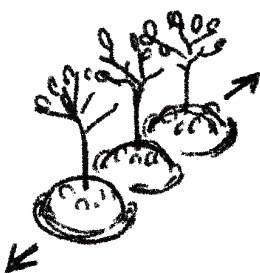
It is a good idea to put cut grass or trimmed branches inside the recessed areas all around.

Get rid of any unnecessary perennial plants. For other plants, all you have to do is use scissors to cut any unnecessary parts and place them on top of the soil. Do this as if you are giving a haircut!

Be sure not to plow them into the soil.

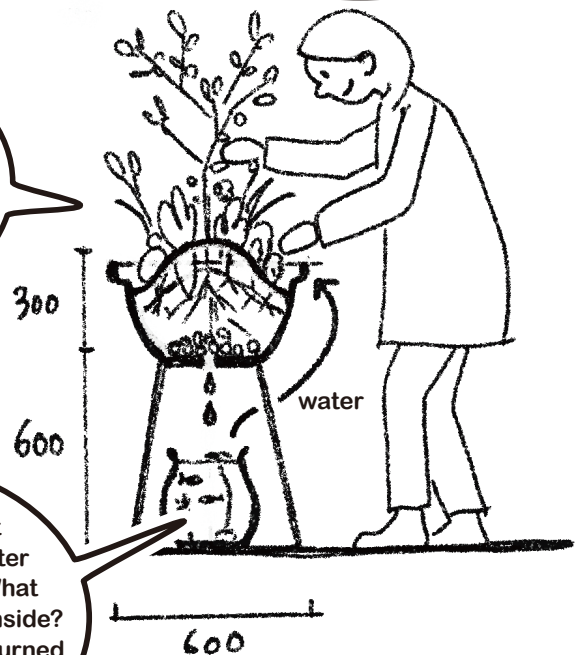
If a planter is slightly raised up like a baby stroller, there will be more feelings of closeness.

If you want to grow a lot more plants...



Connect them together and make everything bigger! You may even try introducing the potted plants into an open field!

Try to capture any water that passes through the planter into an aquarium tank. What would happen to any fish inside? If the captured water is returned to the top, this will create water circulation.



No tilling, fertilization, or pesticides

The learning kit area will gradually grow and build up a topsoil ecosystem while manifesting various powers of diversity. The roots of dead plants decompose in the soil, leave behind small veins, and create a soft structure which allows air to pass through. For this reason, no tilling is required. Above-ground parts of plants that wither and pile up on top of the soil are decomposed by soil organisms into natural fertilizer. For this reason, there is also no need to provide fertilizer. And, because the various plant, animal, insect and bacteria populations find their own balance, the area will not be completely eradicated by a single type of disease or the feeding damage from a specific type of insect. This also eliminates any need for pesticides. And because the small ecosystem is open to the surrounding ecosystem network, unexpected visitors will also drop by. While observing the learning kit area that changes day after day, please enjoy the time you spend interacting together with it. Keeping an observation journal is also recommended.



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P.14 Management Conditions



Let's try our hand at increasing diversity



Plant other seedlings whenever ground becomes available from harvested or withered plants.

It is also a good idea to plant more seeds.

Leguminosae plants (beans)
Asteraceae plants (sunflowers)
Allium plants (onions)

Amaranthaceae plants (pigweed)
Apiaceae plants (parsley)
Lamiaceae plants (mints)
Cruciferae plants (mustards)
Solanaceae plants (potatoes)
..., and more!



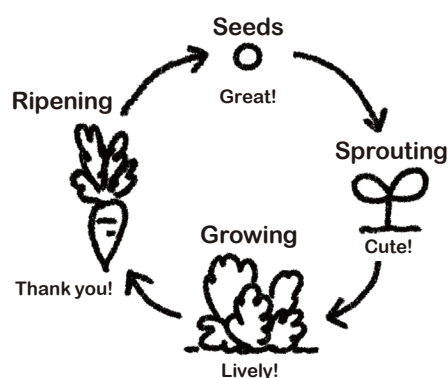
Synecoculture Manual
P.11 Biodiversity



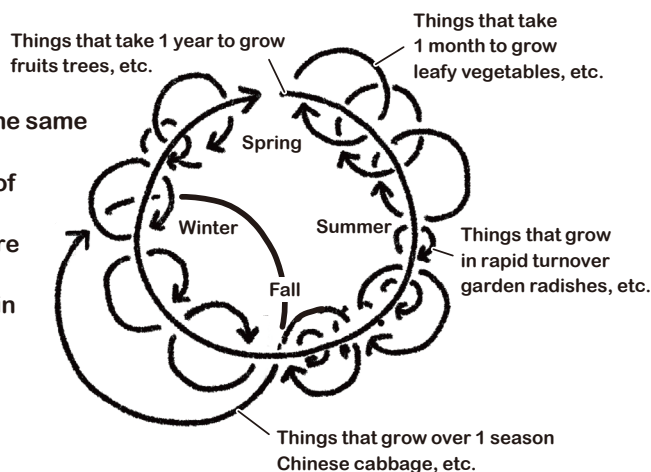
Synecoculture Manual
P.18 Search Method



Let's try to feel the life cycle of plants



Everything will begin at the same time when the planter is first set up, but the pace of everything will gradually shift as different plants are all mixed together. Observe the differences in pace, any overlapping, think about the order, and try to fill in any empty gaps.



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P.17 Space-Time Seed



Synecoculture principles learning “harvest”

We are often asked “What are the best things to plant in the field?” So, what exactly is the “harvest” that you reap from fields and planters? The important thing here is imagination. Let’s inflate our imagination. The first thing that immediately comes to mind is food, because there are so many different things to eat. The eating of seeds, leaves, and plant stems. Roots, potatoes, fruits, beans, etc. You can eat things raw, boiled, baked or pickled, also make juices and dried foods.

Additionally, activities such as making tea, enjoying scents, and processing into spices can be considered for parts that are not directly edible. You can also make oral medications, ointments, and bath salts. You can enjoy flowers, pick cotton,



make cloth and threads, and substances can be used as a source for paper, household items and construction materials. Plants are used as fuel, and even coal originally comes from an ancient fern plant. Alternatively, they can be used for decorations, sending presents or good luck charms. Even feelings such as the excitement you get when taking care of plants, the feeling of your heartbeat thumping when there is bad weather, and thinking about what to do next time when plants die too soon! Shouldn’t all of these things be considered as part of the “harvest”?

While many things are well known, there are other things that only you will notice.



Finding your own theme and planting whatever you like or find attractive will help you start interacting with the ecosystem as a first-hand experience. In other words, you will have direct access to the Earth’s ecosystem network through the healthy topsoil. We believe what evokes this imagination would be the principal “harvest” in learning the Synecoculture principles.



So we encourage you to plant whatever you are fond of and learn from the whole experience. Please share your experiences and your own methods of interactions with us, whenever possible. We are looking forward to hearing from you.



The front cover picture is an image of the “functioning of ecosystem cycle” in the raw. Imagine a story of a butterfly that starts flying from the mountains, travels from one green to another, and eventually reaches the center of the city. This network is difficult to see inside cities, but by keeping a learning kit close by, you can actually experience the response to visitors from the network and the natural environment. Healthy topsoil is the largest foundation of any ecosystem network, and you and the small amount of topsoil you raise are all part of this network.

This guide is based on the separate “Synecoculture Manual”
For any further details, please refer to that manual.



It can be downloaded from the following URL.
<https://www.sonycsl.co.jp/tokyo/407/>

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