

-Chapter 4-

SOIL PREPARATION



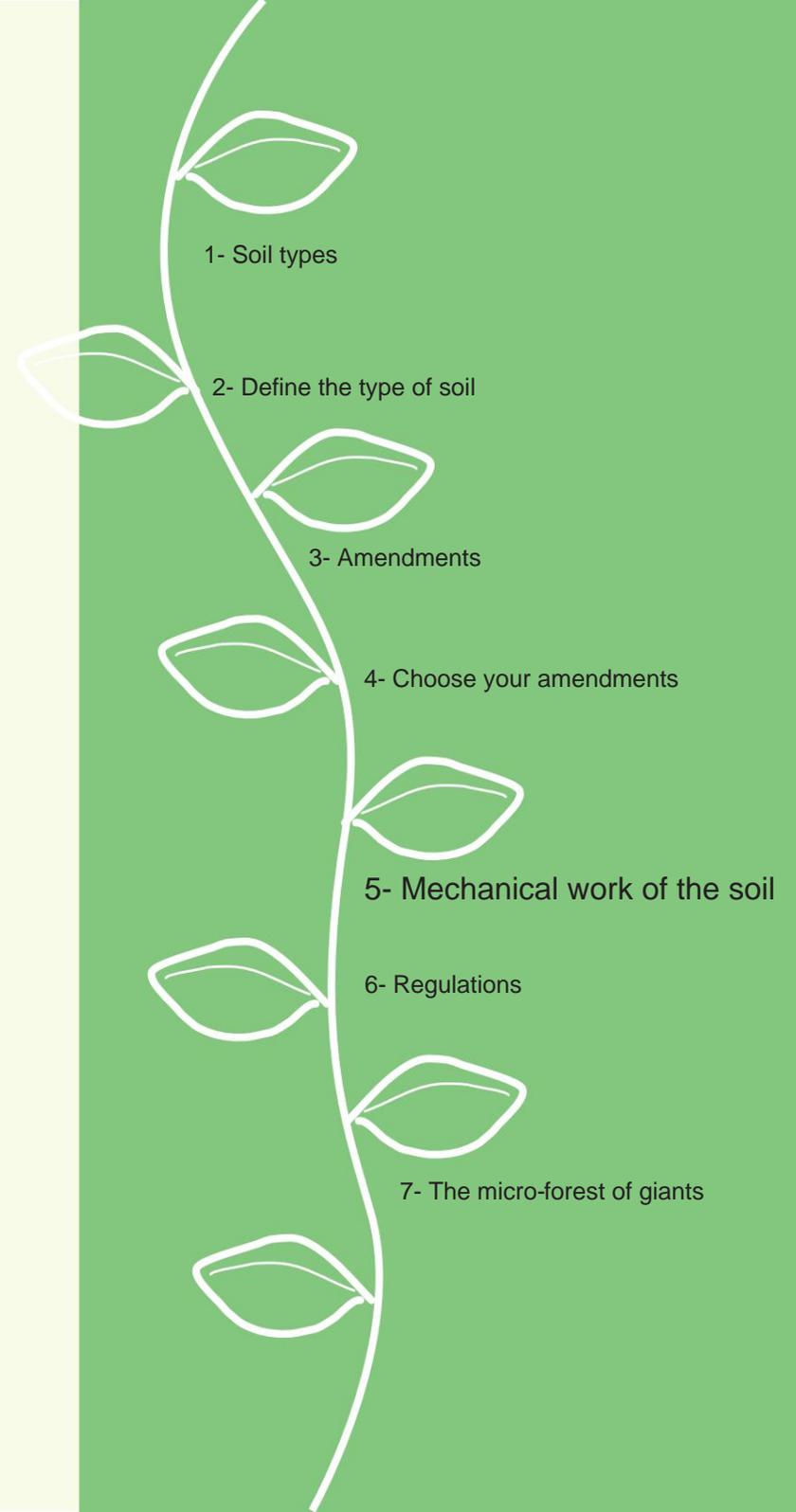
Why work the soil?

The soil in a Miyawaki forest needs to be fertile to allow the trees to grow in good conditions.

The goal of soil preparation is to recreate the fertility and structure of a mature forest soil.

For this, human intervention is essential, especially in urban areas where the soil is often compacted and poorly nourished.

Before each planting, it is therefore necessary to loosen the soil in depth and add various amendments which will enrich the soil thanks to the work of a shoveler and a digger.



1- soil types

Soil fulfills many functions essential to life: it is the basis for plant development, it is home to significant and little-known biodiversity, it stores and releases carbon... This is why having a living and functional soil is essential for the proper development of micro-

soil composition

Soil is composed of **90 to 95% mineral elements** produced by the degradation of the parent rock. The **remaining 5 to 10% is organic matter** (compost, manure, green manure, decomposed mulch, etc.) as well as fauna (earthworms, etc.) and flora that live in and on the soil.

Soil types can be classified into three categories according to the size of the mineral elements:

- **sands** : the largest elements, more than 0.05mm
- **silts** : between 0.02 and 0.05 mm
- **clays** : less than 0.02 mm

These more or less fine particles which constitute the texture of the soil also affect its physical properties, in particular its pH which can be measured by a few simple tests

SANDY SOIL:

Light, easy-to-work soil in which roots develop easily. Permeable to water and air, sandy soil warms up quickly. It does not retain water or nutrients, requiring more watering and a larger quantity of amendments.

SILTY SOIL:

Soil rich in silt deposited by alluvium, making it rich, light, and easy to work. Like sand, it is permeable to air and water, requiring more abundant watering and amendment. In addition, a crust of sludge can form on its surface due to rain or trampling; it therefore needs to be worked regularly.

CLAY SOIL:

Heavy soil that is difficult to work: dry and cracked in summer, and in winter when waterlogged it becomes sticky. However, the soil is very rich, with a high water retention capacity which allows good rooting of plants and limits watering and amendments.

2- define the type of soil

It is possible to determine the type of soil in your land using simple tests. To do this, we will present four tests that will allow you to better understand your soil, its properties, and its needs.

PUDDING TEST: [VIDEO]

It allows the agronomic quality of the soil to be tested (not the richness).

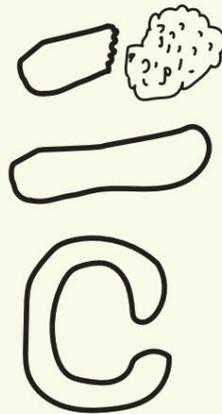
Take a little soil from several places on the ground and mix it with a little water to make a sausage.

- **Crumbled sausage:** sandy soil

- **Easy to make pudding:**

mostly silty soil

- You can make a **circle with the sausage** without breaking it: clay soil

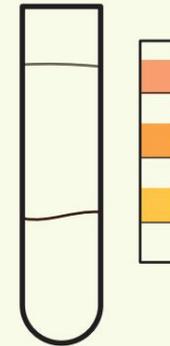


PH TEST: [VIDEO]

The pH of a soil (Hydrogen Potential) allows you to define its state of acidity or alkalinity. The majority of soils have a pH between 4 and 9. Several methods are available to you:

- PH test available commercially with strips or probe

- Have a sample analyzed at your garden center

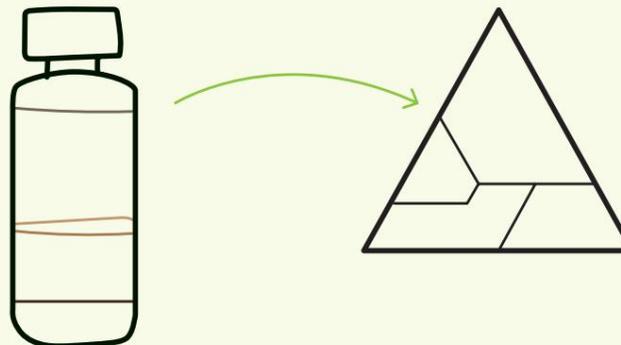


JAR TEST: [VIDEO]

It allows you to assess the percentage of silt, clay, sand and organic matter in your soil.

To do this, simply fill a jar with soil halfway up, add water, shake and let it sit for at least a day.

To calculate the proportions: $\text{layer height} / \text{total height} * 100$.



TRIANGLE OF TEXTURES: [PHOTO]

The result of each component proportion is to be placed on the texture triangle.

At the intersection of the proportions, we can read the type of soil.

3- the amendments

The amendments will help create the right conditions for rapid soil regeneration. For ecological and logistical reasons, local resources should be favored, which can sometimes be quite complicated in urban areas, but not impossible! You just have to be creative!

1. COMPOST

Compost helps **retain water**, aerate and **structure the soil**, but also **fixes and releases the nutrients** that plants need to produce their organic matter. Organic matter is transformed into compost by **the action of millions of living organisms** : earthworms, ants, woodlice, etc.

bacteria and fungi.

When we amend soil with compost, we also add this **micro-fauna** which will ultimately allow us to recreate an **autonomous ecosystem**.

2. MANURE

Manure is a mixture of animal droppings (sheep, goats, horses, galliformes, etc.), straw, and other plant waste. It is a **concentrate of organic matter**, just like compost. It provides **nitrogen and potassium**, and helps **improve soil structure** in the long term .

Fresh manure decomposes poorly, which is why it's important to compost it first. The less you can differentiate between droppings and straw, the more composted the manure will be.

3. THE GRINDING

Wood chippings are a collection of **plant fibers** of varying thickness. Wood chippings often come from **cutting trees and branches**, which are then ground up. All types of tree species may be present, although conifer chippings should be avoided because they acidify the soil and hinder plant growth. The plant fibers act **as a sponge to absorb moisture and gradually release it back into the soil**.

Microorganisms in the soil also feed on these fibers.

4. THE STRAW

Mulch is made up of plant fibers, most often straw, hay, leaves or even chippings, which cover the ground.

This technique has several advantages: - **protects the soil from evaporation** and keeps the soil cool and moist. - protects the soil from water runoff

and **erosion**.

- The degradation of the mulch allows **nutrients to be released** that are accessible to plants

4- choose the amendments

Once you've determined your soil's composition and structure, it's easier to understand what its soil needs in terms of amendments. The Miyawaki method encourages working with local resources; never using fertilizers or synthetic materials.

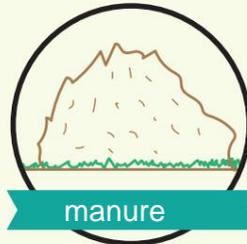
the need to amend

The soil of a forest contains 10 times more organic matter than that of a cultivated field, and between 2 and 5 times more than that of a private garden.

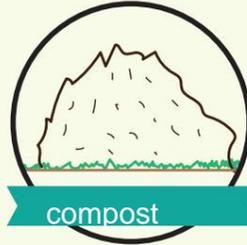
The diversity of amendments will allow you to work on the fertility, water retention and granularity of the soil.

The basic ratio for clay soil in an urban environment is 0.15 m³ of amendments / m² of planting

Generally speaking, local species are rather frugal and there is a risk of not providing enough amendments and having slower plant growth.



manure



compost



the ground material

SOL COMPACT :

Create cavities by mixing amendments of various sizes. E.g.: coarse compost, manure, shredded plant fibers

SOL SEC :

Improve water retention by adding plant fibers

POOR SOIL:

Add nutrient-rich organic matter such as manure or compost

DRAINING SOIL:

Add amendments that will retain water such as compost, chippings or manure

ADVICE

You'll often have to combine different amendments, trying to optimize logistics and transportation because costs can be high. Your different amendments will also condition the tools used to work them. Favor spades if you're working with manure, as well as shovels, spades, and rakes for compost and chippings.

5- mechanical work of the soil

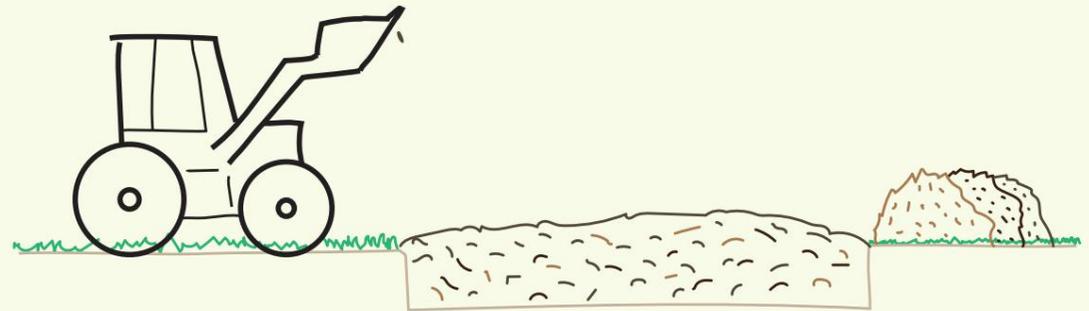
Tillage disrupts soil life and the organisms that make it up. The Miyawaki method recommends loosening the soil at the beginning of planting to create optimal conditions for tree growth.

the theory

Tillage involves **loosening the soil to mix in the amendments**. This mixture is carried out to a depth of 50 cm to 1 m.

The work is generally carried out with a **mini-excavator**. The size of the mini-excavator will depend on the surface area to be worked. From 100 to 400 m², a 3.5T mini-excavator equipped with three buckets will be sufficient. The choice of the depth of the soil work is made according to the structure observed during the preliminary soil analysis and is confirmed during the first strokes of the mechanical shovel in the soil.

The soil work is carried out by a shoveler and generally takes several days. If the planting is done on land crossed by underground networks, you will need to ensure that your shoveler has undergone **AIPR training** and it is also preferable, but not mandatory, that he has passed the CACES category 1 for machines of less than 6T



ADVICE

Make sure your shoveler understands the theory and sticks to it. It's important to work with them to identify the most appropriate locations for delivering the amendments. Proper placement of the amendments on the site can save them a lot of trips back and forth. It's often best to place small piles around the planting area.

6- regulations

When you plan to plant on a plot of land, it is likely that it will be crossed by various networks (e.g., pipelines, power lines, etc.). It is therefore essential to follow the requirements and regulations in force before starting planting.

DT / DICT

AIPR

[The Declaration of Works Project \(DT\) and the Declaration of Intent to Commence Works \(DICT\)](#)

allow network operators to be informed. The form must be sent to each network operator identified in the field using the [networks and pipelines](#) online service (account creation is required)

The Authorization to Intervene Near Networks (AIPR) has been mandatory training since January 2018. The pelliste must hold this authorization.

tillage in the calendar

D-3 months



Allow 15 days from receipt of the declaration.

The DICT must be done within 3 months of the DT's response, otherwise the DT must be redone.

Book the services of a shoveler and a mini excavator for the day(s) preceding the big day

Mark out the planting site with tape

Delivery of amendments

D-Day



It is important that planting is done in the days following soil cultivation, to benefit from light soil.

Allow approximately 150 m² / day for the work of the pelliste. Estimate to be refined with him of course

7- the micro-forest of giants

For our first micro-forest planting, we carried out various soil analysis tests, then we were supported by Urban Forests in the choice and quantity of amendments as well as soil work.

soil analysis



In the Giants' Microforest, we conducted a soil analysis to try to determine its texture and fertility. It can be noted that the soil is heterogeneous in color: initially dark brown (rich in organic matter), lighter areas can be detected (poor in organic matter).



We first extracted a core sample about 25 cm long to examine its color and the living organisms present.



We then carried out a PH test which showed a rather acidic PH between 5 and 6, a sign of low activity of the microorganisms.



The sausage test which showed that we were in the presence of clay soil.

amendments

The soil of the giant micro-forest is clayey, compacted, with an acid-neutral pH and rather rich in organic matter. Our main problem will be the dryness of the soil during the summer. Mulching and incorporating chippings into the soil will be even more important.

Type of amendments	Quantity/100m2
Broyat	5m3
Compost	5m3
Manure	5m3
Straw bales (12kg)	18 units (to be renewed)

soil work

For the Giants' micro-forest we knew that a network was present in the ground and that we would need a pellist with AIPR.

Having difficulty finding a pelliste available for the duration of the work and possessing the AIPR, we decided to train ourselves and a member of the collective passed the CACES and the AIPR.

The soil work lasted approximately 3 days during which the shoveler loosened the soil and mixed the various amendments. The volunteers then leveled the ground to prepare for planting.

and now ?

You've identified your soil structure and networked to find amendment suppliers.

Now it's time to focus on organizing the planting itself and planning the big day. To help you with this step, you can consult the following chapter: **"Planting"**.

We remain at your disposal to discuss your project.



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