YARD4ALL

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Organic Garden Maintenance Manual

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1. COMPOSTING

Composting is a process that aims to turn organic matter into valuable material. It consists of the decomposition of domestic residues by the action of microorganisms that in the presence of oxygen (aerobic process) turn into a substance called compost.

The compost obtained in the end of the process will be used as fertilizer, given that it improves largely the soil structure. The compost develops natural fungicides and beneficial organisms that will help to eliminate the pathogenic organisms that may disturb the soil and the plants.

Cold long-term Compost

You will only need a backyard where you can make a small pile of organic residues and cover it with a layer of dirt and dry leaves.

1.1. Residues that can be composted

All the organic materials have a mix of Carbon © and Hidrogen (N), also known as ratio C:N. Organic residues that can be decomposed are classified in brown and green; the brown residues contain a biggest proportion of carbon ©, being generaly dry and the green residues have a larger amount of hidrogen (N), being usualy moist. To make sure that the decomposion happens in the best possible way, one needs to have a large variety of residues.

On the following list you will find both green and brown residues that can be decomposed, and materials never to be used in this process.

To be composted:

Green	Leftovers of raw vegetables and of fruits
	Coffee leftovers, including paper filters
	Cooked rice and pasta
	Green leaves
	Teabags
	Cereals
	Weeds (without seeds) and Grass Cuts and flowers
	Mashed eggshells*

	Bread*
	*These materials should be used with parsimony as they take a long time to decompose

Brown	Straw
	Wood shaves
	Sawdust
	Dried grass and weeds
	Dried leaves
	Small branches

1.2. Materials never to be used in the compost pile

Fish, meat, seashells, dairy and fats

Animals excrements (as they might contain pathogenic agents that can survive the decomposing process)

Residues of gardens treated with pesticides

Sick or infested plants

Ashes

Weeds with seed (if the compost is to be used in the field)

Textiles, paint, batteries, glass, metal, plastic, drugs, chemical products, Factors that have an impact in composting.

Size of the residues: it should be from 3 to 7 cms depending on the usage of the final product

1.3. Air and humidity

Air

Moving the compost pile is essential for a good decomposition of the organic material in an aerobic environment (with the presence of oxygen). One of the various ways to put air in the pile is to move the materials with a fork or a rake. Airing the pile is also important for the decomposing process, by promoting the mixture of materials.

Humidity

The microorganisms that help decompose the organic material need a certain amount of humidity to move themselves throughout the pile decomposing the material. A simple way to test the humidity in the pile is to take a small amount and squeeze it in your hand. If the humidity is ideal, some drops of water are supposed to drain through your fingers.

If the pile become to dry, the decomposing activity might slow down or even stop. To raise the humidity in the pile it is necessary to add some water, with the help of a watering can, when moving and airing the pile, to assure an equal distribution throughout the pile.

If, on the other hand, the pile has become too moist, you might notice a smell to rotten eggs. To solve this problem, move the pile more often to evaporate the humidity or add brown residues (dry residues rich in carbon) to absorb the excess moist.

Placement

The compost pile should be placed with easy access, ideally on the ground to allow for the water drainage and the entrance of microorganisms from the soil to the pile.

In a dry weather, with higher temperatures, the compost should be under a tree or on the shade to prevent the excess dryness and cold in the pile. In places where the rain is frequent, the pile should be covered as the excess water slows down the process.

1.4. Problem - Possible cause - Suggestion for a solution

On the following list you will find the main problems, causes and solutions in a domestic compost.

Slow process - too much brown residues / too big brow residues - add green residues / air the pile

Rotten smell - excess moist / excess green residues / compact - Turn the pile / add brown residues / make the pile smaller by dividing it

Plagues - Rests of meat, fish, bones, sauces or greases - Taking these foods from the pile / cover the pile with a layer of dirt or brown residues / using a compost rodents proof / turning the pile / watering the pile. In case of ants the pile is too dry

1.5. How to build a Worm Compost

Where to put it and under what conditions

In a shady place

With easy access to water

With waterproof and lightproof coverage

Materials needed

A big container with a valve or tap to drain, for example an old bath tub, that should be suspended

How to do it

Put a small net over the draining hole

Put a small container to receive the liquid humus

cover the bottom of the big container with small branches to make a bed that can keep the oxygen level

Spread a layer of good quality dirt with about 3 to 4 cms thick

Spread over the previous layer one other layer with moist raw residues (fruit and vegetables peels, coffee leftovers) note: do not put citrus peels or long fiber vegetables such as onions or leek. Cut all the pieces into 3 to 4 cms cubes.

Over this layer, spread one with carbon with the same thickness as the previous so that the previous layer is fully covered (use dry leaves, moist cardboard, straw…)

Turn this mix weekly, and rebuild all the layers

When the worm compost is almost full, push the mixture to the side and stop adding food to that side

On the empty side of the worm compost, start the process from step one, so that the worms start going to that side

When all the worms are on the new side, take the older part of the compost, that is, the humús

Filter the humús through a fine net and keep it in a shady place until it is used on the garden

Humidity Control

Unbalance symptoms

Bad smell and mosquitoes mean not enough carbon. In this case add dry matter and turn.

Ants and rolly pollies mean not enough water. In this case water a little bit.

Using the Húmus

Solid Húmus:

Adding to the compost to enrich it

Spreading over the soil to give macro and micronutrients, bacteria, etc…

Liquid Húmus:

Watering young plants to make rooting easier

Using when watering as a soil balance correction when the plants are fragile (ex: yellow leaves)

2. SOIL MAINTENANCE

2.1 Initial recovery

Green compost to give nitrogen and other nutrients to the soil

- Sunflower
- Various legumes (vetch, yellow lupine, for example)
- Clover (red clover, white clover, subterranean clover)
- Linen

Animal manure non totally fermented

Recovery time: 6 months whenever it is possible

2.2. Operations for a continuous maintenance after the first crops

Lifting the residues and keep them on the shade

Lifting the soil coverage and reserve

Adding about 10cms height of animal compost well fermented

Cover with the crop residues again

Turn all this mixture, lightly, until it's mixed in the superficial layer of the soil

Use the coverage that was taken to cover the soil and add more dry leaves, straw or dry grass without seeds, in such a way to get a 10cms thick layer

2.3. Regular maintenance for soil enrichment with green fertilizer

In between crops, in such a way that it matches the beginning of the spring or the autumn, spread green fertilizer seeds

hypothesis 1 - Autumn

about 150gr. of sunflower

about 150gr. of clover

about 150gr. of lupine or yellow lupine

hypothesis 2 - Spring

fava bean (1 to 2 seeds every 15 cm)

pea (2 to 3 seeds every 20cm)

2.4. Crops rotation

In the end of each crop, sow or plant a new crop, in companionship.

Consult the following image for Companion Planting (Chapter 3. Companion planting)

3. COMPANION PLANTING

Companion Planting

Companion planting can be described as the establishment of two or more plant species in close proximity so that some cultural benefit (pest control, higher yield, etc.) is derived.

Vegetable Companion Planting Chart

Plant	Good Companions	Bad Companions
Basil	Pepper, Tomato, Marigold	
Bush Beans	Beets, Cabbage, Carrots, Cauliflower, Celeriac, Celery, Chard, Corn, Cucumbers, Eggplant, Leek, Lettuce, Parsnip, Pea, Potato, Radish, Rosemary, Strawberry, Savory, Sunflower, Tansy, Marigold	Basil, Fennel, Kohlrabi, Onion
Pole Beans	Carrots, Cauliflower, Chard, Corn Cucumber, Eggplant, Lettuce, Marigold, Pea, Potato, Radish, Rosemary, Savory, Strawberry, Tansy	Basil, Beets, Cabbage, Fennel, Kohlrabi, Onion, Radish, Sunflower
Beets	Bush Beans, Cabbage family, Lettuce, Lima Bean, Onion, Radish, Sage	Mustard, Pole Bean
Cabbage Family	Bush Beans, Beets, Carrot, Celery, Cucumber, Dill, Lettuce, Mint, Nasturtium, Onions, Rosemary, Sage, Spinach, Thyme, All Strong Herbs, Marigold, Nasturtium	Pole Bean, Strawberry, Tomato
Carrots	Beans, Brussels sprouts, Cabbage, Chives, Lettuce, Leek, Onion, Peas, Radish, Rosemary, Sage, Tomato	Celery, Dill, Parsnip
Celery	Almost everything except —> —> —> —>	Carrot, Parsley, Parsnip
Corn	All Beans, Beets, Cabbage, Cantaloupe, Cucumber, Melons, Parsley, Peas, Early Potatoes, Pumpkin, Squash	Tomato
Cucumbers	Bush Beans, Pole Beans, Cabbage family, Corn, Dill, Eggplant, Lettuce, Marigold, Nasturtium, Onions, Peas, Radish, Tomato, Savory, Sunflower, No Strong Herbs	Potato
Eggplant	Bush Beans, Pole Beans, Peas, Peppers, Potato, Spinach	Fennel
Lettuce	Everything, but especially Carrots, Garlic, Onion and Radish	— none —
Melon	Corn, Nasturtium, Radish	Potato
Onion	Beets, Cabbage family, Carrots, Celery, Cucumber, Lettuce, Parsnip, Pepper, Spinach, Squash, Strawberries, Tomato, Turnip, Savory	Asparagus, Beans, Peas, Sage
Parsley	Tomato	— none —
Peas	Bush Beans, Pole Beans, Carrots, Celery, Chicory, Corn Cucumber, Eggplant, Parsley, Early Potato, Radish, Spinach, Strawberry, Sweet pepper, Turnips	Onion, Late Potato
Potato	Bush bean, Cabbage family, Carrot, Corn, Horseradish, Marigold, Onion, Parsnip, Peas	Cucumber, Kohlrabi, Parsnip, Pumpkin, Rutabaga, Squash family, Sunflower, Turnip, Fennel,
Radish	Beet, Bush Beans, Pole Beans, Carrots, Cucumber, Lettuce, Melons, Nasturtium, Parsnip, Peas, Spinach, Squash family	Hyssop
Spinach	Celeriac, Celery, Corn, Eggplant, Cauliflower	
Squash	Corn, Onion, Radish	
Strawberry	Bush Beans, Lettuce, Nasturtium, Onion, Radish, Spinach	Cabbage, Potato
Tomato	Asparagus, Basil, Bean, Cabbage family, Carrots, Celery, Chive, Cucumber, Garlic, Head lettuce, Marigold, Mint, Nasturtium, Onion, Parsley, Pepper, Marigold	Pole beans, Corn Dill, Fennel, Potato

Herb Companion Chart

Herb	Companions	Bad Companions	Pests Repelled
Basil	Tomatoes	Rue	Flies, Mosquitoes
Borage	Tomatoes, Squash, Strawberries		Tomato Worm
Caraway	Loosens soil.	Dill	
Catnip	Eggplant		Flea Beetle, Ants
Chamomile	Cabbage, Onion		
Coriander			Aphids
Chervil	Radish		
Chives	Carrots		
Dead Nettle	Potatoes		Potato Bug
Dill	Cabbage	Caraway Carrots	
Fennel		Most plants dislike	
Feverfew	Roses		attracts aphids away other plants
Flax	Carrots, Potatoes		Potato Bug
Garlic	Roses, Raspberries		Japanese Beetle, Aphids
Horseradish	Potatoes		Potato Bug
Henbit			Insect Repellent
Hyssop	Cabbage, Grapes	Radishes	Cabbage Moth
Lavender	Southernwood, rosemary, wormwood		Moths -
Marigolds	Plant everywhere in garden		Mexican Bean Beetles, Nematodes, others

4. MICRO AND MACRONUTRIENTS, SOIL PH AND BALANCE

4.1. Some general notions about soils

The ideal soil is naturally fertile, rich specialy in calcium, magnesium, phosphor, potassium and nitrogen, available, that is, ready to be absorbed by the plants, with a high quantity of organic matter, with microorganisms in activity[1].

Of all these elements in balance we get, as a result, a LIVING SOIL.

4.2. Macronutrients and Micronutrients

Micronutrients are those the plants absorb in greater quantity, and are divided in main:

- Nitrogen
- Phosphor
- Potassium

And secondary:

- Calcium
- Magnesium
- Sulphur

The micronutrients are absorbed in a smaller quantity but are as needed as the macronutrients. These are:

- Iron
- Manganese
- Zinc
- Copper
- Molibdenium
- Chlorum

[1] A balanced ph, that is a hydrogen potential between 6 and 7, makes an easy absorption of macro and micronutrients.

The causes for the plants need that determine a unbalanced development, therefore, deficient, may be resumed in three:

- natural soil depletion, that is, it might not contain the nutrients needed
- low ph (acidic soil) or high ph (alcaline soil) wich can block the nutrients in such a way that the plants aren't able to absorb them
- antagonism between nutrients (for example potassium excess bolck magnesium absorption)

5. PRECONDITIONS FOR PROTECTING THE ORGANIC GARDEN

Planting of perennial aromatic herbs (thyme, lavender, rosemary, etc.) to ward off pests and enhance the appearance of bees and other pollinators.

Creation of a pond to balance and / or repair the ecosystem

Planting of native trees that enhance soil balance and the appearance of a population of predators.

6. MAIN TYPES OF SOIL AND RESPECTIVE IRRIGATION

Sandy soil	Coarse grain
Frequent and reduces watering	Lack of manure
	Lack of nutrients

Clayey soil	Fine grain
Sparse and abundant watering	Strong structure
	With nutrients

Irrigation types

Drip watering - adequate in clay soils or when there are low water resources

Sprinkler watering - normally used in sandy soils

7. PLANTS DISEASES AND NATURAL SOLUTIONS

How does one identify the plants' main problems?

- Eliminate the chance for a problem with animal source - plagues - or fungi - diseases.
- Eliminate physiological causes (such as cold, wind, too much water ou not enough water)
- Observe the symptoms in the plants. Usually the needs will appear symmetrically on the leaves

Nitrogen (N)
It gives the plants its green colour (chlorophyll). It's responsible by the plants vigor - the need for it will manifest itself in the older lower part of the plants, where the leaves become yellow and end up falling. The plant is weak and yellow.

Solution: apply organic compost, animal or plant based

Phosphor (Ph)
Responsible for the roots and floriation development. Its need manifest itself also on the lower and older part of the plant, the leaves become dark green and become purple ending up falling.

Solution: apply birds manure or algae compost

Potassium (K)
Responsible by the resilience of the plants to plagues, diseases, dryness and cold. It strengthens the plant immune system. The first symptoms show up in the older leaves that become dry and with a dry border, but when the need is strong it is the younger sprouts that end up drying.

Solution: cow manure well fermented

Calcium (Ca)
Not very frequent. It is the strengthening element for the transportation mean for other nutrients, within the plant. It balances out the plant ph, that is. the alkaline salts and the organic acids. The symptom for its need is necrose of the point and apexes of the young leaves. The leaves become dry, old and with bites in the borders.

Solution: generally a simple application of lime, in the autumn, over the soil, is enough to solve the problem.

Magnesium (Mg)
Is another one of the elements needed for photosynthesis (conversion of sunlight in food). It helps the growth also. Its need symptoms are usually manifested by necrose between the ribbing and edge of the leaves, remaining a nonaffected triangle closer to the stem.

Solution: applying liquid humus from worm compost during the watering process for 2 weeks in a row, once a week. Applying chromium and yarrow and dandelion mulch.

Iron (Fe) and manganese (Mn)
Essential to the nourishing process, namely to the absorption of sulphur and nitrogen, as well as converting the light in food. Its need is manifested by yellow leaves, with green ribbing.

Solution: nettle mulch and watering with nettle tea once a week for 2 to 3 weeks in a row.

Sulphur (S)
Essential for the protein production and enzyme and vitamins development. Responsible for the root's growth and seeds production, growth of the plant and cold resistance. The symptom is a general clorose (the plant becomes yellow, especially in the higher part of the plant)

Solution: applying sulphur dust over the soil

Zinc (Zn)
Helps to regulate the plant growth and helps to preserve the chlorophylle. Its needs symptoms will appear as closures in between ribbing and the young leaves will show folded edges

Solution: basalt dust application

Boro (Bo)
Essential when the seeds are in formation and the fruits are in development. The need symptoms include abnormal growth of new sprouts after the death of the apical meristem (the main stem).

Solution: adding enough organic matter to the soil

Molybdenum (Mo)
Helps to use the nitrogen, converting it in ammonium cyanide. It is very similar to nitrogen in what concerns solutions for the needs.

Copper (Cu)

It helps to fix the atmospheric nitrogen. It is important for the reproduction of the plant (seeds). The symptoms for its need include death of the apical sprouts and distortion of the young leaves. The leaves become dark and crooked. Copper excess, very often used in the "Bordeaux mixture", can block other nutrients (for example, iron) and stop the roots development.

Chlorine (Cl)

It's a part of the photosynthesis. The need symptoms include leaves tanning. The roots growth stops.

Images that illustrate the needs:

Lack of nitrogen

Lack of calcium

Lack of copper

Lack of sulphur

Lack of iron

Lack of phosphor

Lack of magnesium

Lack of potassium

Lack of zinc

8. COLLECTING AND SELECTING SEEDS

In this chapter we will approach the collection, selection and preservation of seeds.

8.1. Plants that spread seed by flower

Colleting and selecting seeds from plants that spread seed by flower (for example: lettuce, swiss chard, beetroot, leek, parsley, cilantro, carrots, onions, etc…)

- Chose a plant that shows health and resistance;
- Severe the branches with the seeds when these are about to loose
- Keep the branches, preferably in cotton bags, and hank them in an airy, cool shaded place.
- Loose the seeds by hitting the branches or manually picking after they’re totaly dried.
- Select the seeds that show more quality, that is, bigger, fuller, healthier.
- Identify the seeds with the following elements: name of the plant, variety, origin, time of picking and growing cycle.
- Keeping, preferably in an opaque paper, in a fresh, dried, shaded place.

8.2. Plants that contain the seeds in its fruits

Selecting plants and fruits of the best quality, that has revealed more resistance to diseases and fungus.

- Leave the fruit in the plant until totally ripe
- Pick the fruit and open it to collect the seeds
- Leave the seeds to dry over a paper or dish, in a dry, airy, shaded place, to allow a clean drying process, that is, without fungi.
- Select the seeds that show more quality, that is, bigger, fuller, healthier.
- Identify the seeds with the following elements: name of the plant, variety, origin, time of picking and growing cycle.
- Keeping, preferably in an opaque paper, in a fresh, dried, shaded place.

8.3. The importance of using organic, non-hybrid, non-genetically modified (OGM) seeds

Hybrid or OGM seeds will become sterile in two or three generations:

Plants from hybrid or GMO seeds can pollinate plants in areas around that can reach several miles around, becoming, also, sterile.

Losing genetic diversity, namely for local and traditional varieties.

Creating total dependency from the farmers towards corporations, producers and distributors of seed, given the impossibility to maintain and collect their own seeds.

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