The influence of the planets in the configuration of trees and their role as source of fertilization.

Fertilization from ARTs point of view goes beyond providing macro and micro nutrients for plants. It embraces a broad sense of understanding including the correct handling of etheric and soul forces. Those forces provide nutrition and vitality to crops.

1 - Trees as an expression of the landscape: the link between Cosmos and Earth.

The researcher Rudolf Steiner has made several contributions about the vegetable kingdom, especially the trees. According to him plants are the expression of the soul on Earth. It can be individually manifested and understood in its nuances as the human soul is: "... the vegetable kingdom is the earth's soul which becomes visible through plants. It can be compared to the human soul. However, more than comparing them we have to appropriate the real forms of the plants. For that we start from a general view until we reach each individual plant". (The Art of Educating III, GA 295, pg 117, 1919)

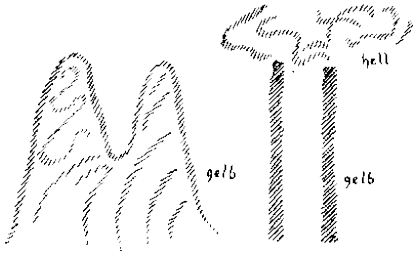
We can look at plants individually, but also in the context of the landscape. From that look it is possible to shape a cohesive whole. When we take a close look at the different biomes, they reveal significant differences in the shape of the plants. The physiognomy of a landscape is the sum of the many particular expressions which form a unit. It is in the landscape that ART draws its inspiration when designing cropping systems.

In the landscape trees connect the Earth to the Cosmos and the Cosmos to the Earth. Trunks and branches structure reveal themselves when well observed. The trunk is described by Steiner as the very earth that protrudes upward and on which the buds, branches, leaves and flowers grow as if they were an 'upright meadow' (Rudolf Steiner, GA 295, pg 114).

Following closely the prolongation of a tree trunk we reach its top. The trunk is born from the earth and projects itself towards the Cosmos. The tree lives, therefore, between the Earth and the Cosmos, just as the soul lives between the body and the spirit. This upward movement is the tree gestural "soul". By observing this gesture we get into the individuality of the trees.

The thinner the branches the more alive and closer to the cosmos they are. The thicker the deadliest and closer to the earth. Together these thick and thin branches express cosmic archetypal forces. These forces are shaped and configured by carbon.

2 – The artist carbon: the building entity of life.



During the 3rd lecture of the "Agricultural Course", Rudolf Steiner described carbon, or rather the archetypal entity of carbon, as the "great sculptor". It is the carrier of all formative and configurative processes of living beings.

This explains the enormous success of fertilizing soils with ramial chipped wood (RCW). RCW performs well in both tropical and subtropical climates. It's not just the chemical elements from the branches that fertilize the soil. They also bring cosmic formative forces from the planets through the arboreal carbon which becomes part of the soil.

It is important to observe that the carbon quality in the branches is quite different from the carbon in the trunks. For the purpose of fertilizing the soil and activating the life processes, carbon that is closer to the cosmos is more appropriate than the carbon closer to the earth. That is because the tree branches are richer in young lignin while the trunk is richer in old lignin. Young lignin has short polymer chains and old lignin has longer chains. Young lignin is a material accessible to soil´s life. It is easily degraded by Basidiomycetes, feeding and leading various processes. Lignin is the great precursor of the formation of humus in the soil.

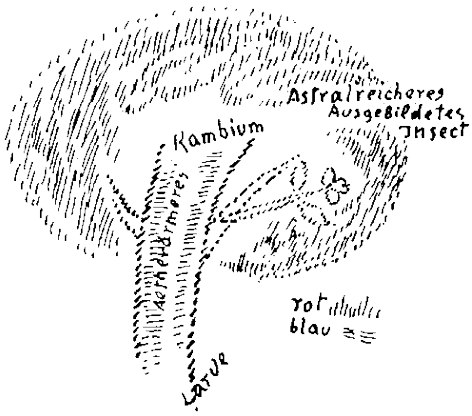
3- Trees as vitality donors: principles of ART fertility

Steiner emphasizes that life is penetrated into matter by vital and etheric forces through humic substances. This process is facilitated when the gesture of the matter to be vivified is pointed towards the cosmos, like the gestures of trees that go from the ground up, opening up as branches.

"... if, anywhere in the world, the earth element detaches itself from the shallow ground and projects itself outwards, it will acquire a specific inclination towards the living. It will have a predisposition to be penetrated by vital and etheric forces. For this reason it is easier to impregnate a common soil with vital forces and fertilizers if it is erected in piles of earth endowed by humic substances. This way the earth acquires the tendency to become internally alive, to become like plants. The same process occurs in the formation of trees. The "earth" (the trunk) projects itself upward and sustains the plant (buds, leaves and flowers) by giving it vitality and etheric forces" (Steiner, 1924).

ART considers that principle of going toward the cosmos and also pays attention to the importance of etheric forces in the soil vitalization. But ART adopts a particular management of these forces. Instead of making compost piles to capture Cosmos energies, ART uses the branches of trees. They are fragmented and are applied directly to the soil. This material undergoes a decomposition process that activates the live process with much less energy.
Planting fertilizer trees suppliers of CRW contributes to the capture of atmospheric carbon by transferring it to the soil. This is a way to turn each tillage into a carbon sequestration spot. This management contributes to the landscape environment in a broader sense by going beyond its boundaries when sucking the

excess of carbon from the air.



At the same time that the tree enhances life, bringing vital and etheric forces, it also attracts astral forces in the periphery of its canopy. This is evident in the abundant presence of insects and birds around trees.
The tree's periphery is marked by the presence of lively beings. In the thicker and lower layers of the trunk it is more "mineralized" and less vitalized which originates wood.

Source of drawing: R. Steiner ...

New sprouts:	Ramial wood:	Trunk wood:
Abundant in cellulose, sugar and water. Little matter.	Abundant in young lignin, C:N=45:1, ideal precursor of humus. Same C:N of compost.	Abundant in cellulose, hemicellulose and old lignin, C:N=300:1. Does not suit as fertilizer

Is every tree source of fertilization? In principle yes, but there are subtle differences. Considering that trees are earthen matter impregnated by cosmic forces, we got to the planetary trees, briefly described by Rudolf Steiner. This subject is a path opened by him, but explored by few people. *Nico Brodnitz* is our biggest reference in this matter. He researches the influences of planetary trees on trees, especially in the tropical climate, for decades.

4 – A look at the trees towards the Cosmos:

Rudolf Steiner (Agricultural Course, 1924) described that the life of a plant does not end at its physical contour. Each physical form of trees corresponds to a "corresponding-form" that extends itself into the far away cosmos.

Trees can be seen as cosmic substances molded on earth as can be seen as earthly substances shaped by the cosmos. This substance is also created by the contribution of the stars and planetary forces, especially by the solar element. The solar element favors the rising above the earth, a gesture that trees have in common with human beings.

Like the Sun, each planet contributes and influences the gestures of the trees. It is in this sense that we get to planetary trees as a source of earthly and cosmic fertilization.

5 – Influence of planetary forces in the plant shape

The forces of each planet act differently in the plant's and tree´s form. They operate in different intensities, often becoming poly-present once they act at the same time in the same tree. That is why it is important to understand the forces and gestures of each planet and that is why it is difficult to reduce and correlate these influences in a simplistic way. Careful observation is essential.

5. A - Planets' influence on the Organography (plant organs)

Each planet manifests itself through a specific tree organ. The manifestation is stronger or weaker depending on the species.

Root - manifestation of the planet Moon
Stem - manifestation of the Sun
Shell - manifestation of Mars
Leaf - Mercury manifestation
Flower - manifestation of Venus
Fruit - manifestation of Jupiter
Seed - Saturn manifestation

All trees have roots and they are influenced by the Moon to some degree. But when we analyze the roots from the point of view of the planetary forces we realize that the expression of them is different from species to species. One of the things that distinguishes a lunar tree from others is the intensity with which the root manifests itself.

5. B – Planets' influence on the tree growth habits

Each planet represents a different part of the plants and they also manifest themselves through gestures, that means, through the growth habit of the plants.
Moon: The Moon is related to the watery element and to generosity, being visibly present in the succulents.
Sun: The Sun is related to the vertical growth, straight with no bifurcations. We recognize the Sun in the straight-up and in the pioneer plants.
Mars: Mars is the representation of combat and persistence. The pioneer who opens paths which is observed in pioneer shrubs and bamboo. They start slowly and continue growing until they form a clump.
Mercury: is recognized by movement, typical of the air element. It is present in climbing plants as the Lianas.
Venus: Venus is the representation of the feminine, welcoming and niceness. Characteristics noticed in broadleaf herbs.
Jupiter: This planet is magnificent, leafy, being the one that best represents the trees themselves.
Saturn: Represents everything that is dense and dark. Conifers have this element strongly present the same way a mango tree.

5.C - Planets acting in the expression of landscapes

Planets act not only at the specific level of plants but also in a broader way: in the landscape. Which can be seen in the correlation of how planets influence Brazilian biomes:

Moon: This is a powerful and fluid planet, like water. There is no better environment than the Amazon to show the Moon's action.
Sun: a planet that stimulates growth towards the Cosmos in a straight, unique and upright movement. The Cocal (in Maranhão/BR), rich in palm trees, is the highlight.
Mars: Mars allows growth to take place overcoming any difficulties. The Cerrado is this biome which after each fire continues to recover itself.
Mercury: Mercury is dynamic and busy. It brings certain confusion as observed in the Pantanal where lakes and low hill ranges intertwine without apparent order.
Venus: It is the female planet. There is no better biome than the Caatinga, with its exuberant flowering, to realise the strength of Venus. Venus is present in leguminaceae trees, being that 50% of the Caatinga is composed by those species.
Jupiter: Atlantic Forest, which is the magnificently arboreal biome, is the greatest manifestation of Jupiter: exuberant and rich in fruit.
Saturn: The planet that works through density and shadow. The Araucaria Forest which grows very dense forming a dark environment materializes the action of Saturn's power.

6 - Tropical tree species with planetary signature

Choosing a species of tree as a supplier of planet´ s forces involves several criterias. These forces reach their target through RCW. We call your attention to some aspects which should be considered:

a) The species should have an unmistakable and easily recognizable planetary expression.
b) Preferably be an exotic plant, with no restrictions on management due to environmental laws limitation.
c) Have economic use.
d) Have great regrowth capacity after pruning.
e) Be adapted to the environmental conditions, fitting the specificities of the place.
f) Be easy to propagate by seed or stake.
g) Feed bees for honey production and be a shelter for birds, bats and arachnids.
h) Have dense wood and still be easy to cut.

In the table below you can find the most common species that have already been used in the ART projects. The projects were developed in the Southeast of Brazil consequently it was emphasised the Atlantic Forest species:

GROUPS	**Tree**	**Special**	**Shrub**
PLANETS	**Classic**	**Large size**	**Small size**
Moon	Mulberry	Banana tree	*Schefflera arboricola*
Venus	*Melia azedarach*	*Tecoma stans*	*Tecoma stans*
Mercury	*Anadenanthera*	*Acacia*	*Malvabisco*
Sun	*Bactris gasipaes*	*Araucaria angustifolia*	*Dracaena trifasciata and Sphagneticola trilobata*
Mars	Jackfruit	Bamboo	Annatto
Jupiter	Avocado	*Syzygium cumini*	*Hibiscus*
Saturn	Eucalyptus	Conifers	*Dombeya wallichii*

7 – The ART Fertilization System: RCW of planetary trees combined with green fertilizers

7.1 – Forest strip

The ART management recommends the planting of fertilizing planetary trees inside the crop production, in forest strips. The strip area recommended was designed considering the need of 4 kg/RCW/m2 per year and a distance between the forest strips sufficient to provide physiological comfort for the crops. These indications can be adapted to each specific farm.

7.1.1 - Forest strips in numbers:

Fertilizer trees need to provide sufficient quantities of RCW for the commercial crops. The indication is 220 to 573 trees/ha, planted in double strips (2m between strips).

7.1.2. - How many trees to be planted:

Forest strip width = 4.0m, being 2.0m spacing between lines + 1m distance on each side
Distance between strips = 16m; being 12m the free area between the strips

The result is 6,25 strips of 100m/ha; which is equivalent to 625 linear m of strips/ha;
Considering 2.30m the distance between the trees in the lines (x 2 lines) the result is 573 trees/ha

Therefore, in 10,000 m2 (1 ha) 2,500 m2 will be forest strips and 7,500 m2 will be commercial area. It is important to consider that between the 2 m between the lines of forest strips other crops can be planted. With the objective to bring

more economic return we do recommend pumpkin, beans, fruits such as papaya, citrus and jaboticaba, *Plinia cauliflora*.

The trees will be ready to supply RCW from the 3rd year after planting. That may vary depending on the species and specific conditions of the spot. You can follow a calculation made for the avocado tree based on an experiment carried out in Cabreúva, at the bottom of Serra do Japi.

Experiment conditions: stand of 543 trees/ha planted in double strips. The pruning is made on 50% of the trees (273) each year. So each tree is pruned every 2 years. While 50% of the trees provide RCW the other 50% act as windbreak providing physiological comfort for commercial crops cultivated between the strips.

Avocado	Tree top volume (m^3)	RCW produced (Kg)	Covered area (m^2)	Quantity (ton/ha)
1 tree	15	117	27,3	43
273 trees (1/2 stand)	4.000	32.000	7.500	43

7.2. - The green manure

When combined with green manure, 43 ton/ha of RCW/per year is enough to support the development of commercial crops. Although there are positive experiences of fertilization using only RCW in temperate climate, ART recommends its use in combination with green manure. They are complementary and synergic. RCW is a long-lasting fertilizer richer in C, while green manure is a medium-lasting fertilizer richer in N. Leguminosae green manure carries Venusian planetary forces complementing RCW forces. It foments reproduction and consequently fruiting.

ART is a methodology in experimentation and the use of RCW and green manure combined in different application times is being tested. At first, the indication is that the application of MRF is done at the beginning of the dry season, in March or April, followed by the commercial crop until November. The green manure is sown in the beginning of the rainy season. Green manure must remain in the field for 60 to 75 days. This period of rest is important for the soil´s regeneration that remains covered and protected during the hottest and wettest season. It allows the soil life to act and to prepare the soil for the next crop.

During this period the CRW undergoes a laminar composting process while the green manure acts in depth, cycling nutrients. From February onwards the green manure is mowed and the commercial crop is cultivated in no-till.

8 – Collaborations of ART to reduce climate change

ART captures carbon from the atmosphere by planting trees and by managing soils in a tropical regenerative way. When the branches are placed over the soil,

all that carbon of RCW, as lignin, participates in various processes of life. In the end, the carbon is retained in the form of humus. To better demonstrate how ART contributes to the reduction of the effects of climate change, we list some information:

- The trunk of the 573 trees/ha is a carbon stock;
- There is an increase in the humus content in the soil, which can reach the amount of 4%;
- The no use of trucks to bring external fertilizers avoids a common source of carbon emissions in agriculture;
- The no use of cattle manure implies in the no emission of GHG that is usual in traditional organic and biodynamic agriculture;
- The minimal soil disturbance results in few machine hours used in soil preparation;

Besides that, arises the question: is ART able to retain more carbon than emits? In order to answer that questions we have been researching carbon footprint at Finca Sabores. Join us if you wish, we are looking for partners and support.

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