

Banana tree as Green Manure?

Summary: normally green manures are made with annual plants, such as *Mucuna spp* and corn, Pigeon pea and Jack bean (*Canavalia ensiformes*). However, there are alternatives which are seldom used: the banana “tree” produces excellent biomass, in its false and not woody stem (made up of the bases of the huge leaf stalks), poor in nitrogen and phosphorus, but rich in potassium, sodium and micronutrients and therefore trophobiotic balancer, promoter of phytosanitary for risky crops: solanaceae (tomatoes, peppers and eggplants) and cucurbitaceae (mini watermelon, melon and cucumber) and many others; In this way, the ‘banana tree’ appears as a novelty in gardens and orchards; the source of this prodigious biomass, the ‘banana trees’, can also be used as a windbreak, to manage the microclimate and generate physiological comfort; Read more about its rich repertoire:

1.Introdução

It may seem strange to suggest that a fruit plant assumes the role of green manures. Would it not be the opposite: the fruit trees enjoying the fertility generated by green manures?

It happens that the banana tree is very productive as whole plant; and versatile, highlighting by presenting an enormous vegetative vigor. It is at the same time "tree", as bush or shrub and a gigantic herbaceous (non-woody) plant. Its stem is underground, and what looks like the trunk is a pseudostem formed by the thickening of all leaf sheaths. And what beautiful leaves! In addition to being large, they are also palatable, being appreciated by pigs, cattle, goats and many other herbivores.

2.Agricultural applications of banana

In many systems the banana tree is a key plant, mainly in agroforestry systems. In others, it assumes the function of 'shading tree' or creator (coffee, mango, among other perennials). It is also planted to minimize the harmful effects of frosts on coffee. In addition, it is positioned as a windbreak to protect vegetables. Even with so many applications, its potential as a fertilizing tree is still unfairly underestimated. Compare the quantities of biomass from the banana tree with traditional green manures:

Species	Black Oat	Sunflowers	Crotalária spp.	Banana tree
Green manure mass/cycle (ton/ha)	30 - 60	40 - 50	50 – 80	50 – 90

It can be seen that the banana tree is not behind other green manures in green mass production (quantity). Now we have to assess the quality of the biomass supplied. It is also necessary to evaluate successful experiments in the perennality of banana plantations and the unconventional uses of banana plantations.

3.The banana tree as a Potential fertilizer

The 'banana tree' is a demanding crop in soil fertility. So much so that in conventional plantation it prefers virgin soils after deforestation and it is recommended to renew every 5/5, 8/8 the whole plantation, no more than 10/10 years. **That the 'banana tree', inserted in a given system, can be an agent of co-generating fertility, is not normally conceived.** An example of this ability to become perennial while maintaining productive potential is found in the report by Bertoni in 1926, and edited by the Paraguayan Ministry of Agriculture in 1954, about a Banana plantation implanted in the early 17th century. This one was perennial for 300 years and led him to develop a similar and highly sustainable system (the integrity of this report will be published later).

4.Some properties of the banana plant mass (qualities)

With regard to quality, we immediately perceive that it is a non-lignified phytomass with relatively low protein content. This qualifies its biomass for a trophobiotic action (phytosanitary by nutrient balance) in the fertilization of several crops. See below a table with the main elements extracted by the banana tree:

Banana: Amount of Elements Removed per Hectare, Grow of Cultivar "Dwarf" in Cut.				
Element	Fruit + Stem	In other parts	Total	% Exported by the Fruit.
N (kg)	148	116	264	56
P (kg)	20	12	32	63
K (kg)	633	428	1.053	60
Na (kg)	1.662	2.542	4.204	40
Ca (kg)	21	138	159	13
Mg (kg)	22	41	63	35
S (kg)	5	6	11	45
B (g)	165	282	367	43
Cl (g)	87.000	212.000	299.000	29
Cu (g)	69	51	120	58
Fe (g)	707	2.340	3.055	23
Mn (g)	813	6.033	6.846	12
Mo (g)	0,3	1,0	1,3	23
Zn (g)	139	218	357	39
Al (g)	620	2.196	2.816	22

SOURCE: Gallo et al (1972)

The table shows us a significant amount of K (potassium) that the banana tree mobilizes in its rhizosphere, to then recycle. Similarly, the amount of Na (sodium) and Cl (chlorine) extracted draws our attention. Such contents become particularly interesting when we need K and Na as 'trophobiotic brake': containment of N absorption (particularly NH₄) causing an increase in systemic resistance in fertilized cultures.

One can better understand the advantageous relationship of the banana tree with soils originating from granite-gnaiss (crystalline complex, coastal mountain chain and coastal highlands, 'Mantiqueira chain', south of the state of Minas Gerais and other Mountain chains, which exactly release these required nutrients in generous proportions.

By these findings the banana tree reveals its fertilizing potential. Its biomass, when it covers the soil, brings an increase in biological, physical and chemical fertility. The implementation of an entire 'Banana tree' plantation is more expensive than a green manure or even a cocktail of green manures, which can raise economic issues. But the cost/benefit ratio improves in the medium term, because it is a perennial source of biomass; and it improves even more if we think about planting in strips around the crops and in the exploitation of the productive and agroenvironmental potential of the banana tree throughout several cycles. In this case, the cost/benefit ratio becomes very favorable!

5. Manuring of banana trees

The banana tree reacts very well to fertilization with organic fertilizers of various origins. Especially RCW, as happens in Agroforestry and "Agrofloresta" (Ernst Goetsch), produces very good results. Two other less common fertilizers call attention by the positive result in the banana plantations: wood ash (natural wood, untreated!!) and sea salt / coarse salt (without addition of Iodine), do very well to the full nutrition of the banana tree!! These two confer greater phytosanitary, strengthening the plant against fungal diseases (panama and sigatoka diseases) and generating better quality in fruits.

6. Banana tree as a desalinating agent?

If we carefully observe the amounts of nutrients extracted by the biomass of the banana tree, we will realize that from the macronutrients sodium (Na) is the most extracted, and from the micronutrients is chlorine. NaCl = salt, soil salinizing agent. These data reveal the potential of the banana tree to act in the desalination of a soil by extracting these two nutrients.

7. Banana tree as windbreak

In this modality, the banana trees are planted in dense, possibly double hedges around the plantation, obtaining a considerable wind-breaking effect by the high density of the clumps. In vegetables, they are planted along the contour lines and bordering the roads. They form a network capable of breaking the wind and converting the residues of other fertilizers into new biomass. Biomass that can return to the soil via *mulching* or incorporated into the surface soil as laminar composting. There may also be a gain in productivity and phytosanity by the windbreak effect. In vegetables, or any other herbaceous culture, the longer the stomach opens, the greater the photosynthetic activity. This is how the 'banana tree' leads to positive results with broad sustainability.



8.The banana tree as a ‘nursery’ plant

When an orchard or coffee plantation is planted, the banana tree can assume the role of a ‘nursery’ plant and perform several functions at the same time, such as:

- Provide partial shade to newly planted crop.
- Provide biomass for soil protection and fertilization, i.e., a high-quality mulch.
- Multiply the existing fertility by its root system and the efficient shading in the intense insolation season.

To carry out these functions, the banana trees has to be interspersed with the (perennial) benefited crop, consortium that usually generates mutual benefits. The spacings used vary according to the situation, depending on the architecture of the plants, the climatic particularities and the local relief. An example of this system are the mango or guave orchards implanted with the help of the banana tree, as shown.



9.The banana tree as a tomato fertilizer

In organic tomatoes, grown in a greenhouse, the chips (greater fragments) of the banana tree trunk were used to fertilize the soil where tomatoes are grown. We first exchanged 50% of the organic compost for banana chips and then 75%. Application of the banana chips was made like this: In the sequence:

- a) **A layer of banana chips covering the soil**
+ 25 % composting usually applied.



- b) Laminar Composting Process, inside the soil:
Banana chips with 25% of the usual dose of organic composting.



- c) 14 days of maturation of laminar composting.

The chips remained in laminar composting, in the soil, for 14 days, before planting. It is known that the tomato plant adapts well to semi-decomposed biomass in the soil.

d) Results on tomato plants

The result of bananatrunk chips fertilization on tomatoes can thus be described:

- leaf colour: “flag green”, not darkened;
- leaf size: medium, not puffy, no oversize;
- denoting mild deficiency of N, nitrogen;
- very good plant health condition, leaves with none spots or necrosis; astonishing health.
- saladette tomatoes, for dressing, but perfect and intact fruits, with an exceptional, pronounced taste;
- the tomatoes were supplied to a restaurant that made a lot of sauce for popotone. They had to reduce the addition of spices, because the tomato came "seasoned" from the origin, with high Brix grade e intensive flavor.
- great longevity of tomatoe plantas, obvious vitality, expressed in their tireless ability to sprout.
- productivity: from 4 to 4,5 kg fruits/m².

However, a valid suspicion is that the production of colour, flavour and phytoalexins will be higher than in other fertilizations!



ONE QUESTION: Do we want to sell water and tomato fibres? Or do we want to produce and sell flavors, herbal compounds, all that typical that only the tomato has?

To crush the banana tree trunk, you need to dismember its profile and use a compatible machine. It is suggested to consult manufacturers. As a tip, talk to Trapp, from Jaraguá do Sul – Estate of Santa Catarina, Brazil: they always paid attention to the banana tree.

We have in the banana tree a high value ally, with a repertoire rich in opportunities. It's worth a try!

Eng. Agr. Manfred v. Osterroht - ART project
agricultura@regenerativa.art.br

www.regenerativa.art.br