7 Elements for implementing Regenerative Coffee Farming

November 2024

INTRODUCTION

The Global Coffee Platform in Brazil's 2030 Collective Action[1] aims to increase the resilience of coffee crops to climate change to ensure the prosperity of 95,000 small and medium-sized coffee farmers. Considering that the promotion and adoption of regenerative agriculture practices are essential to move in this direction, Plataforma Brasil gathered information on the subject[2] to start a process of harmonization of concepts, practices, and indicators to guide producers in the transition to a more regenerative production system and to monitor the implementation of practices. This process is taking place collectively and participatively through the Brazil Working Group[3] and began during the International Coffee Week, in Belo Horizonte, in November 2023. On the occasion, researcher Madelaine Venzon (Agricultural Research Company of Minas Gerais – EPAMIG) was invited to join the discussion.

Subsequently, Plataforma Brasil promoted the webinar "Regenerative Agriculture - Step by Step" in January 2024, with contributions from Victor Monseff (Agronomist and coffee grower; Ribersolo) on the topics of bioanalysis and soil health; and Heitor Cantarella (researcher; Agronomic Institute of Campinas – IAC) on the rational use of Nitrogen and its relationship with carbon footprint.

In February 2024, a field day took place at the headquarters of the Association of Mountain Coffee Growers of Divinolândia (APROD) with the participation of members and partners of the Platform operating in Brazil, family farmers members of APROD and researchers Teotonio Soares de Carvalho (Federal University of Lavras – UFLA) and Guilherme Chaer (Brazilian Agricultural Research Corporation – Embrapa). The central theme was "Combining science and practice to strengthen soil life through Regenerative Coffee Farming", with complementary discussions on how to scale impact in the field through the adoption of Regenerative Coffee Farming practices.

In April 2024, a workshop was held with about 50 representatives of 33 entities operating in the coffee sector at the headquarters of the Integral Technical Assistance Coordination (CATI-SP), in Campinas, to conclude the definition of the concept and practices of Regenerative Coffee Farming. **During the meeting, a proposal was presented and the participants had the opportunity to discuss, share**

[1] The Global Coffee Platform is an international association with more than 140 members from all links in the coffee chain and is present in 6 countries. Its mission is to promote the prosperity of coffee growers, the improvement of well-being and the conservation of nature. Learn more at: www.plataformaglobaldocafe.com.br

[2] REGENAGRI – Pela saúde e bem-estar da terra, v2.1, 08/2021; KDP Regenerative Agriculture & Conservation – Monitoring and Evaluation Guide for Project Partners, v1.1, 06/2022; NESTLÉ – Regenerative agriculture for low-carbon and resilient coffee farms, A Practical Guidebook, v1, 2023. RAINFOREST ALLIANCE – Regenerative Coffee Scorecard, A Best Practices Guide, 2022. SAI PLATFORM – Regenerating Together, A global framework for regenerative agriculture, 2023. ILLY CAFFÈ – Sustainability Report, 2022.

[3] The Brazil Working Group of the Global Coffee Platform suggests solutions to the main challenges of the coffee sector, facilitates technical discussions on key topics and contributes to the sustainable advancement of the chain. It is made up of more than 20 institutions such as technical assistance and rural extension agencies, associations, cooperatives, exporters, industry, certifications and civil society entities.

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their opinions and make suggestions to polish the concept, practices and the "7 Elements for the implementation of Regenerative Coffee Farming", as well as to start the discussion on Performance Indicators, which should continue throughout 2025.

To date, representatives of the following organizations have contributed to this process:

- Agrobiota
- Agrogenius
- Agrovista
- Brazilian Coffee Industry Association (ABIC)
- Association of Mountain Coffee Growers of Divinolândia (APROD)
- Association of Specialty Coffee Producers of the Circuito das Águas Paulistas (ACECAP)
- Atlantica Coffee (Grupo Montesanto Tavares)
- BASF
- Bayer
- Biotrop
- Blue Coffee
- Volcanic Region Cafes
- Certified by Minas Café
- César Candiano
- CLAC-Fairtrade
- COFCO International
- Comexim
- Confederation of Agriculture and Livestock of Brazil (CNA)
- Brazilian Coffee Exporters Council (Cecafé)
- National Coffee Council (CNC)
- Coocacer Araguari
- Coocaminas
- Agrarian Cooperative of Coffee Growers of São Gabriel (Cooabriel)
- Agroindustrial Cooperative of Varginha (Minasul)
- Centro Serrana Agricultural Cooperative (Natercoop)
- Cooperative of Coffee Growers and Livestock Farmers (Cocapec)
- Cooperative of Coffee Growers of the Cerrado (Expocacer)
- Mixed Agricultural Cooperative of Paraguaçu (Coomap)
- Regional Cooperative of Coffee Growers in Guaxupé (Cooxupé)
- Coopervitae
- Coordination of Integral Technical Assistance (CATI-SP)

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- CropLife Brazil
- Brazilian Agricultural Research Corporation (Embrapa)
- Technical Assistance and Rural Extension Company of the State of Minas Gerais (EMATER-MG)
- Agricultural Research Company of Minas Gerais (EPAMIG)
- Empresa Interagrícola S.A. (EISA)
- Technical Assistance and Rural Extension Entity of Rondônia State (EMATER-RO)
- Guaxupé Coffee Exporter
- Wolf Farm
- Three Girls Farm
- Federation of Agriculture and Livestock of the State of Minas Gerais (FAEMG)
- Tristão Group
- Hanns R. Neumann Stiftung do Brasil (HRNS do Brasil)
- Imaflora
- Inspecta
- Agronomical Institute of Campinas (IAC)
- Research, Technical Assistance and Rural Extension Institute of Espírito Santo State (INCAPER-ES)
- Rural Development Institute of Paraná IAPAR-EMATER (IDR-PR)
- JDE Peet's
- Louis Dreyfus Company (LDC)
- Melitta
- Mercon
- Nespresso
- Nestlé
- NKG Stockler
- ofi
- Rainforest Alliance
- Ribersolo
- Brazilian Micro and Small Business Support Service (SEBRAE) & Educampo Project
- National Rural Learning Service (SENAR)
- Rural Employers' Union of Divinolândia
- Solidaridad
- Starbucks
- Sucafina
- Syngenta
- TechnoServe

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- Federal University of Catalão (UFCAT)
- Federal University of Lavras (UFLA)
- Volcafé
- Yara

CONTEXT

The introduction of the "regenerative" concept associated with agriculture occurred in the early 1980s, by American Robert Rodale. He proposed a holistic approach to rescuing and enhancing the principles of organic farming from the 1940s. Over time, many agricultural managements have been improved using conservation strategies that connect with regenerative agriculture. However, despite the wide diffusion and interest in the subject, there is still no legal or common definition of the use of the term "regenerative agriculture".

In coffee growing, successful cases have increasead representing the potential of this production model. The experiments seek greater resilience of the systems, maintain or increase productivity with sustainability. Considering the climatic diversities, tropical soils, production systems and management, the success in the use of agronomic practices with a regenerative vision is favored by competent and professionalized technical guidance.

The benefits are noticeable in soil health and fertility, increased and maintained biodiversity, efficiency in the use of agrochemicals and fertilizers, increased productivity and resilience of the production system. In addition, the potential of practices associated with regenerative agriculture, increasing the carbon stock in the soil and promoting the rational use of fertilizers, has aroused significant interest as a strategy to mitigate the effects of climate change.

The ability to regenerate and improve the health of ecosystems shows that these practices can go beyond increasing the sustainability of agriculture by regenerating systems. Through the integration of agricultural practices and with a systemic vision, it is possible to produce with low socio-environmental impact and increase the resilience of agro-ecosystems. Due to the focus on coffee production system, we will treat "regenerative agriculture" specifically as "regenerative coffee farming", considering that, in general, the approach can be expanded at the property level involving other crops.

Based on research and the broad exchange of knowledge and experiences with members and partners of GCP Brazil, this preliminary document was created; it suggests a concept and recommended practices, organized into 4 major thematic areas (soil, biodiversity, water and enabling environment) and 7 essential elements for the implementation of Regenerative Coffee Farming, as presented below.

These learnings will help guide the future actions of the Global Coffee Platform in Brazil, contained in the 2030 Collective Action for Producer Prosperity.

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CONCEPT

Regenerative Coffee Farming is a production system where the practices implemented increase the resilience and adaptation of crops to the effects of climate change, through the promotion of soil health, crop productivity, carbon stock, water conservation and biodiversity, ensuring ecosystem services and contributing to growers´ prosperity and social well-being.

7 ELEMENTS FOR IMPLEMENTING REGENERATIVE COFFEE FARMING

In order for a greater number of producers to adopt regenerative coffee farming practices and for the sector to continue to improve the way coffee is produced in Brazil, it is necessary to have a prepared enabling environment that offers safe conditions to producers. Many aspects can influence the type of support needed and the most appropriate time to transition from traditional to regenerative cultivation systems – that is, each property has its time and challenges. It is thus considered that the definition of a strategy is specific and influenced by local characteristics, the profile of the rural property, the level of access to technical assistance and credit, etc.

Therefore, the Global Coffee Platform proposes 7 essential elements, collectively defined, so that coffee growers can adopt recommended practices, regardless of the current production system on their properties. The elements were designed considering their sequential development, but it is important to consider that, in practice, there are transversal effects contributing at the same time to the implementation of more than one element.

The following elements and respective practices are recommended and represent possibilities for the implementation of regenerative coffee farming.

1. Construction of soil fertility in depth and rational use of fertilizers
   Soil diagnosis considering physicochemical analyses for the implementation of management and monitoring of fertility up to a minimum depth of 60 cm, aiming at the balance of the Ca/Mg/K ratio, pH, organic matter and macro and micronutrient contents, according to technical reference[4]. Preferably, use fertilizers and fertilizers with higher efficiency and/or lower greenhouse gas emissions throughout the chain. In the case of Nitrogen, prioritize the sources with the lowest losses due to volatilization or leaching. Composting, the use of organic minerals and residues from post-harvest coffee processing, contributes to soil restructuring and are important sources of macro and micronutrients.

2. Humus and organic matter increase
   The combination of clay, organic matter, and microbial activity is essential for the formation of humus in the soil. This process carried out by the organisms that live in the soil provides humic

[4] Modular Fertilization Program (PAM), João Carlos Peres Romero & Joé Peres Romero, Ed. Agronômica Ceres, 2000. Bulletin 100: Recommendation of fertilization and liming for the state of São Paulo. IAC Campinas. 2022. 5th Approximation Recommendations for the use of correctives and fertilizers in Minas Gerais. Editora UFV, Viçosa, Minas Gerais, 1999. FERRÃO, Romário Gava et al. Café conilon. Capixaba Institute of Research, Technical Assistance and Rural Extension, INCAPER, 2017.

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and fulvic acids, which are important for the physiology and nutrition of plants. In tropical soils, humus is also critical in maintaining and increasing Cation Exchange Capacity (CEC). Maintaining an adequate C/N ratio is important to ensure a humification-friendly environment through microbial activity. The use of cover crops helps to increase organic matter and humus, in addition to protecting the soil from oxidation and collaborating to maintain an ideal C/N ratio. In addition to contributing to the suppression of weeds, these plants produce straw or biomass on the soil that will later be transformed into organic matter. Roots leave residues in the soil profile that are fundamental for soil aggregation and structuring, increased porosity, improved water dynamics, biological activation and consequently, make systems more resilient to climate change. Maintaining the soil cover throughout the year or most, including the coffee plantation inter-rows, is an important process to incorporate organic matter into the soil via decomposition of the shoots and roots of these plants. The use of organic input sources, the return of coffee straw/husks, and composting are also recommended to increase organic matter and humus.

3. Introduction & administration of bioinputs and microorganisms
Once the acidity of the soil has been corrected and the ideal fertility has been built, reinforced by the content of organic matter related to the clay content, microorganisms can be added more safely. A high microbial activity in the root region (rhizosphere) will positively influence plant development and health. In the rhizosphere, many organisms establish symbiotic relationships. For example, some nitrogen-fixing bacteria in cover crops of the legume family. Another known beneficial relationship is mycorrhizae, associations between fungi and roots that favor the absorption of water, nutrients and the protection of plant roots against pathogens. The cultivation and permanence of soil covered with cover crops also favors the environment for the development of soil microorganisms. Applications of bioinputs and microorganisms associated with swiddens or organic fertilizers can contribute at the same time to the development of other essential elements for regenerative coffee farming as long as the soil is minimally prepared to receive them.

4. Water holding capacity and soil adequate physical restrustructure
In general, tropical soils of medium texture, within their cation exchange capacity and physical structure, should ideally have 25% air (gases), 25% water, 3% organic matter and 47% minerals. In addition, they should not offer resistance to root growth. The combination of balanced fertility in depth and porous soils, without physical impediment (compaction), are determining factors for root growth and for a rich activity of microorganisms. Physically well-structured soils facilitate access to water by plants in dry seasons, thus increasing climate resilience. In addition, they are able to infiltrate rainwater quickly, avoiding or minimizing soil erosion.

5. Conservation & environmental services
In the context of a rural property, it is possible to benefit the production systems through a flow of ecosystem services with the conservation areas, such as the recovery and conservation of Permanent Preservation Areas (APP) and Legal Reserve (RL). In addition to the conservation of natural resources, such as soil, water and biodiversity in general, in these areas there is a greater presence of natural enemies of pests, pollinators and gene flows. Some strategies such as ecological corridors, hedges and windbreaks, can contribute to this flow of services (bridges), as well as to reduce the spread of pests and diseases (barriers) favoring greater ecological balance. It is important to consider the coffee property as a whole, in order to promote the

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connection between the cultivation areas and those of natural conservation, as well as the connection between the different conservation areas within the property and with neighboring properties, if possible.

6. Ecological & Integrated Pest and Disease Management
   The presence of pests and diseases is minimized in a balanced environment, from the perspective of plant-pest/disease-environment interaction. In these environments, it is necessary that there are ideal conditions for the presence and increase of pathogen antagonists and natural enemies of pests, such as sources of pollen, nectar and shelters. In addition, moisture and soil cover are required, which favor the activity of microorganisms acting in the regulation of pests and diseases. When necessary, other methods of pest and disease control such as physical, biological, cultural and chemical can be used. For the decision making of the method and the moment of control, the results of the monitoring must be used, which contributes to the efficient use of resources, agrochemicals and to a more sustainable production. Integrated and Ecological Management promote a more stable environment and plants are able to tolerate a certain level of damage without compromising production.

7. Living income, fair living conditions, decent work, and integration with rural communities
   Income dignity is a concept that can be defined and measured for each farm size in sustainable farming communities. The minimum productivity and the minimum viable module (area) must be determined so that the coffee producer obtains this dignity of income, through an efficient management system. Periodic income studies are important to adjust the facilitating environment for each production archetype, and certainly, the adoption of regenerative agriculture practices reduces the effects of the intensiveness of the production model, avoiding, mainly, excess inputs and mechanization. Income measurement should always be connected to the regenerative agriculture practices chosen by archetype. In addition, the producer must promote decent work for all who work on the farm. The guarantee of adequate working conditions for workers and residents of the property, with safety and health is fundamental.

BEST PRACTICES

Soil

Improving soil health is one of the pillars of regenerative coffee farming. Well-structured, porous soils, with adequate fertility, which provide depth to the roots and microbial activity, in addition to favoring productivity, have a high capacity for carbon sequestration and storage. Avoiding soil disturbance (minimum cultivation) and keeping it always covered is essential for these goals.

The use of cover crops protects the soil surface, prevents wind or water erosion from occurring, and helps maintain soil moisture. Some species have roots in depth that act in decompaction. There are several potential advantages, including nitrogen fixation, increased organic matter, attraction of natural enemies of pests and pollinators.

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The selection of species should consider factors such as crop size (pruning, production, recepa), soil characteristics and type of management, taking into account the competition for water and nutrients with coffee. In some cases, it is possible to have the soil covered throughout the year using summer and winter species. It is important to keep these plants during the flowering period, as this is when pollen and nectar are provided to natural enemies. At the time of sweeping harvest, for example, it is possible to choose to do it in interspersed interrows, thus keeping the cover crops in half the area. In dense crops or with little incidence of light, the development of these plants is better in zero crop management. In this case, the planting of cover crops takes place after skeleton pruning.

Because they have a low C/N ratio, legumes decompose faster, so it is interesting to use it together with grasses (high C/N ratio). This combination also provides the management of the weeds between the rows of coffee, the supply of biomass, in addition to improving soil structuring, due to the high root development of some species.

Many fungi and bacteria help in the decomposition of biomass and organic matter, producing humus and releasing nutrients to plants. Under the right conditions, the introduction of microorganisms in the form of bioinputs can favor a balanced environment, greater resistance and health for crops.

The use of correctives and fertilizers needs to be planned and follow technical recommendations. Whenever possible, look for nutrient sources that have lower losses after application and reduced greenhouse gas emissions in the production chain. Coffee is a nitrogen-demanding crop, with nitrogen fertilizers responsible for up to 42% of GHG emissions, on average in producing properties[5]. Therefore, the use must be rational, also considering inputs through biological nitrogen fixation and nutrient cycling.

Biodiversity

The benefits of having Permanent Preservation Areas (APP) and Legal Reserve (RL) on rural property go beyond compliance with the Forest Code, the protection of natural resources and the conservation of biodiversity. In coffee plots located close to these natural ecosystems there is a greater potential for biological control and microbial activity in the soil, among other environmental services. Through a systemic look at rural property, some regenerative agriculture practices can favor these flows of benefits between forest fragments and the cultivated area.

Management with cover crops, shrub and/or tree species can connect fragments in the landscape with crops through the formation of ecological corridors. In addition, they can serve as living barriers to winds and to the spread of pests and diseases. Epamig technologies, used by coffee producers in the Cerrado and Matas de Minas, which consist of the implementation of corridors composed of Ingá species, whale weed and the stinky tree and shrubs, are highly attractive to lacewings, wasps, predatory ants and parasitoids. These insects are natural predators of the leaf miner, the coffee borer, mites and

[5] Cecafé Project – Estimation of greenhouse gas emissions and removals from Brazilian coffee. Carbon additionality due to good practices on farms in Minas Gerais, Brazil.

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mealybugs that attack coffee. The ingás and the smelly have a structure called the extrafloral nectary, which produces nectar day and night, all year round. This nectar is used by predators, parasitoids and several species of bees. As a result, honey production increases, which can be an opportunity for additional income for the grower.

Water

Water is an essential resource for coffee production, from cultivation to post-harvest processing. Efficient and responsible use is necessary, especially in regions where irrigation is used to complement the plants' water needs. Global warming and climate variations have affected the amount and distribution of rainfall, which can be a threat to agriculture. Therefore, it is important to keep the surroundings of rivers, lakes and springs preserved with native vegetation. A covered and uneroded soil allows greater water infiltration, which is essential in areas of groundwater recharge.

The Permanent Preservation Areas (APP) contribute to the preservation of watercourses, reduce surface runoff and reduce the silting of rivers. The treatment of domestic effluents and wastewater is essential in order not to contaminate one's own and/or neighbors' water sources. This process can be done with the use of biodigesters, septic tanks or evapotranspiration basins for domestic effluents. Wastewater on rural properties must go through appropriate treatment systems such as separator boxes and/or settling tanks before being disposed of in the environment.

In wet coffee processing, wastewater can be directed to fertigation or reused in the process after going through stages of decantation and separation of solid waste. This water can also be used in the wetting of composting windrows and the solid part used in the production of organic fertilizers. Practices such as these are recommended to avoid inappropriate disposal, reduce consumption and increase efficiency in water use.

In cultivated areas, the implementation of more efficient irrigation systems, such as dripping, and keeping the soil always covered help to conserve moisture and reduce the need for irrigation. The efficient use of agrochemicals, combined with the integrated and ecological management of pests and diseases, contributes to minimizing water pollution, contributing to the sustainability of coffee growing.

Enabling environment

The implementation of regenerative coffee farming practices is a reality to reduce the vulnerability of family growers. Technical assistance and rural extension are fundamental for the successful implementation of more sustainable agriculture models, along with access to credit, inputs, equipment and the market, characterizing the ideal facilitating environment. In-depth and continuous studies on income and production costs in different regions and related to different profiles of growers are necessary to plan and implement effective actions in this regard. Promoting a decent standard of living and ensuring living income should be the objective of programs to support producers, whether in the public or private sector. That means meeting standards for housing, food, water, clothing, education,

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health, leisure, transportation, and other essential needs, including savings for unexpected events. Social organizations, such as cooperativism and associativism, as well as inclusive and participatory planning among stakeholders in the coffee production chain, also contribute to achieving this goal.

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Annex 1

7 ELEMENTS AND PRACTICES FOR IMPLEMENTING REGENERATIVE COFFEE FARMING

ELEMENTS	THEMATIC AREAS	PRACTICES	EXPECTED RESULTS
1. Construction of soil fertility in depth and rational use of fertilizers 2. Increased organic matter and humus 3. Introduction and administration of bioinputs and microorganisms 4. Promotion of water retention capacity, stabilization and physical conservation of the soil 5. Conservation and environmental services 6. Integrated and Ecological Management of Pests and Diseases 7. Welfare income, good living conditions, decent work and integration with communities	**Soil**	- Physical , chemical and biological diagnosis - Correction of soil deficiencies (acidity, fertility and compaction) - Cover crops - Weed management - Bioinputs (macro & microorganisms) - Efficient and balanced use of fertilizers - Rational use of Nitrogen - Construction of soil fertility in depth - Increase in organic matter - Minimum tillage	- Healthy Plants - Improved soil health (structure, organic matter and fertility) - Increased carbon stock in coffee producing systems - Reduced greenhouse gas emissions
	Biodiversity	- Conservation of Permanent Preservation Area (“APP”) and Legal Reserves (RL) - Use of ecological corridors, windbreaks and connectivity between conversation areas - Efficient use of agrochemicals for pest and disease control (MIPD), registered inputs in appropriate dosages and based on MIPD - Cover crops	- Promotion and maintenance of ecosystem services (biological control, pollination, carbon sequestration)
	Water	- Efficient and management water use - Wastewater management	- Water resources conservation
	Enabling environment	- Technical assistance and rural extension - Technical Assistance related to the Internal Sustainability Management System - Access to credit and market - Associativism, cooperativism and developed institutional environment - Access to inputs, equipments, services and technology - Efficient logistics - Family succession and social inclusion	- Stable or increased productivity - Improving income and socioeconomical conditions

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