

SUSTAINABILITY INDICATORS IN AGROECOSYSTEMS (ISA)

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In tropical regions, characterized by intense heat and heavy rains, systems with adequate productivity and resilience require permeable soils, with permanent and diversified vegetation cover and intense biological activity. Different soil management practices have been adopted in Brazil, however, there are some gaps for gauging the management of production systems and soil quality, as well as the integration of physical environment assessment with socioeconomic aspects, especially on the scale of the rural establishment, one of the main players in ensuring desired territorial management and development with a view to adapting to climate changes.

More integrated and diversified systems demand a higher degree of management complexity. For this, the producer will have to plan, reducing uncertainties, anticipating opportunities and challenges, and assessing his environmental and socioeconomic performance, allowing for more effective decision making in this dynamic context. Indicators can generate a diagnosis, as well as monitor possible transformations in progress, in addition to helping promote improvements in highly complex situations.

The system of Sustainability Indicators in Agroecosystems (ISA) was developed for this purpose (Figures 1 and 2). It consists of a questionnaire and several parameters that make up a set of 21 indicators, and aims to detect critical points, propose measures to correct the productive management that may be promoting negative impacts on the environment, and identify opportunities for generating income and practices aimed at adapting to climate change, such as joint actions for soil and water conservation, including revitalizing springs, adequate protection and management of aquifer recharge areas, and, in particular, providing better use of rainwater, from the maximization of the infiltration and, consequently, reduction of the runoff, ensuring that it remains on the land as long as possible. In this context we propose to equip rural producers, technicians, research and public managers, providing a new, more holistic vision and agenda.

Starting in 2008, a long journey of networking began, with the goal of elaborating and improving the ISA system. Since its institutionalization in the state of Minas Gerais, in 2012, the system was incorporated into the work of technical assistance and later expanded to other states.

RESULTS

- Training 750 technicians from Emater/MG and application of ISA in approximately 1,800 rural establishments;
- Application of ISA in approximately 700 rural establishments by SENAR/ ES;
- Forecast of application of ISA in approximately 400 rural establishments in the Rio Doce basin by Fundação Renova (2020); and
- Forecast of application of ISA in 4,000 rural establishments by SENAR in the FIP-Landscape project in the Cerrado Biome involving the states of MG, BA, MT, MS, RO, MA, GO and 10 hydrographic sub-basins (2020 to 2022).

NEXT STEPS AND RECOMMENDATIONS

- O sistema ISA é uma plataforma colaborativa. de domínio público. em processo de ampliação de parcerias. visando o aprimoramento contínuo do sistema;
- Indicadores relacionados à biologia do solo poderão ser integrados ao sistema. tendo como referência o trabalho de pesquisa da Embrapa. capitaneado pela pesquisadora leda de Carvalho Mendes. com as enzimas do solo Arilsulfatase e β -Glicosidase;
- Um dos fatores para prover maior resiliência aos sistemas de produção é uma adequada cobertura do solo durante o ano inteiro. O sensoriamento remoto com base em imagens de satélite pode também ser integrado ao ISA. permitindo monitorar a temperatura na superfície do solo. facilitando a avaliação e planejamento das estratégias para manter o solo coberto o ano inteiro; e
- Sistematização das informações das planilhas do ISA e elaboração de um menu de soluções técnicas disponíveis aos produtores rurais.

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Figure 1: Set of ISA System Indicators.



Source: Authors.

Figura 2: Conservation management aiming to increase the resilience of production systems



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