

Evaluation of the sustainability of the meliponicola sector in southern Ecuador using a sustainability index

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Introduction

- Native stingless bees (*Meliponini*) are essential to maintain fundamental ecological processes involved in plant reproduction and food-producing agricultural systems.
- The ecosystem services stingless bees provide (pollination and honey production) are being threatened by anthropogenic activities.
- There are 600 native stingless bee species in the tropics and subtropics. In Ecuador, more than 200 species of native bees have been identified.

➔ **This study calculates a sustainability index of meliponicola production systems for identifying effective strategies for the sustainable development of the meliponicola sector in southern Ecuador.**

Methods

- Identification and selection of indicators of economic (20), social (12), and environmental (16) sustainability in the literature.

Economic indicators

- The proportion of average income from meliponicola production in average total income.
- The proportion of stingless beekeepers selling divided nests.

Social indicators

- The proportion of women stingless beekeepers.
- The proportion of young stingless beekeepers (15 – 29 years).

Environmental indicators

- The proportion of stingless beekeepers planting honey plants to improve meliponicola production.
- The proportion of stingless beekeepers using pesticides in agricultural production.

Fig. 1. Examples of calculated indicators

- 326 stingless bee keepers were surveyed on their farms, in three parishes (Ciano, El Arenal, and Vicentino) of Loja province in southern Ecuador, where most of the national production is concentrated.
- Statistical description and calculation of indicators and sustainability index of meliponicola production systems. 0 denotes no sustainability and 1 denotes high sustainability.



Fig. 2. Data collection and nests of stingless bees on farms.



Fig. 3. Entry of the stingless bees nests.

Results

- Sociodemographically, stingless beekeepers are mostly men (81%), on average, they are 51 years old. They have low levels of schooling (64% have only primary studies). Their annual average income is 3,072 USD/year, which comes mainly from agricultural activities (cattle and corn).
- In total, they have 5,103 stingless bee nests. On average, each stingless beekeeper has 16 nests and produces 28.1 liters of honey per year. Income from meliponiculture represents 18% of their average annual income.
- The sustainability index of the meliponicola production systems was 0.21. Among the dimensions evaluated, the environmental dimension presented a better situation of sustainability (0.33) with respect to the social (0.18) and economic (0.14) dimensions.

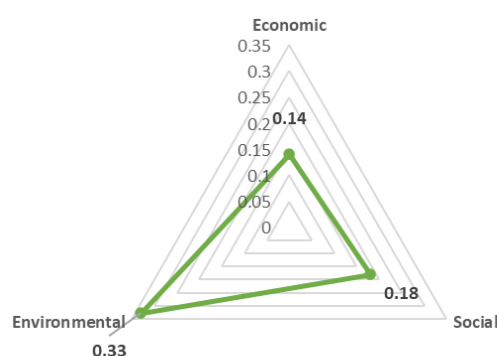


Fig. 4. Value of the dimensions of the sustainability index.

Conclusions

- Indicators and a sustainability index of meliponicola production systems were calculated to establish a baseline that facilitates the evaluation of public and/or private intervention, aimed at the sustainable development of the meliponicola sector.
- The obtained value of the index reflects low levels of sustainability of meliponicola production systems, and therefore, the need for support to efficiently take advantage of the economic, social, and environmental benefits generated by meliponiculture.