

OP-265 [Pollination and Bee Flora]

Harmonious integration of bees and soybean cultivation

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Brazilian agriculture (pastures and crops) occupies 30.2% of the country's land, while 66.3% is preserved as native vegetation. Brazil is responsible for 42% of the global soybean production, cultivated in 46 Mha. Both government and private sector are deeply compromised with the sustainability of the agricultural production systems, avoiding or minimizing environmental impacts. During the last two decades, soybean cultivation approached both honeybee colonies as well as wild bees nesting and foraging sites. Beekeepers have increasingly placed their beehives near soybean fields, because of the large quantities of high-quality nectar produced by soybean flowers. Bee visits provide supplemental pollination, leading to a 10-20% increment in soybean yield, but control of soybean pests may pose a threat to bees. We conducted a series of observational studies and interviews with growers, beekeepers, and pesticide application experts, to identify the best agricultural, apicultural, and communication practices (BPs) to avoid impacts of soybean cultivation on managed or feral bees. Along the 2022/23 and 2023/24 seasons, we followed 17 clusters of farmers and beekeepers, located in different Brazilian soybean regions, to test and validate the BPs, using *Apis mellifera* apiaries near soybean fields as indicators, but also observing impacts on native bees. We scouted soybeans fields twice a week, during blooming, to evaluate the visitation of bees to soybean flowers. Beehives were weekly examined for the sanitary conditions and the strengthness of colonies. Results showed that by strictly following the BPs, no adverse effects on the bee colonies were observed. Improved honey production of up to 50kg/hive was collected, as well as 10-15% increase on soybean yield was achieved. A definitive set of detailed instructions are now available for soybean growers and beekeepers, along with an internet-based course, to enable the harmonious integration of soybean cultivation and bees. By following these instructions - which can be adapted to other crops and implemented in any country - we expect to avoid bee mortality or sub lethal effects, leading to an increase in honey production and crop yield, further reducing the impact on native vegetation and greenhouse gas emissions.

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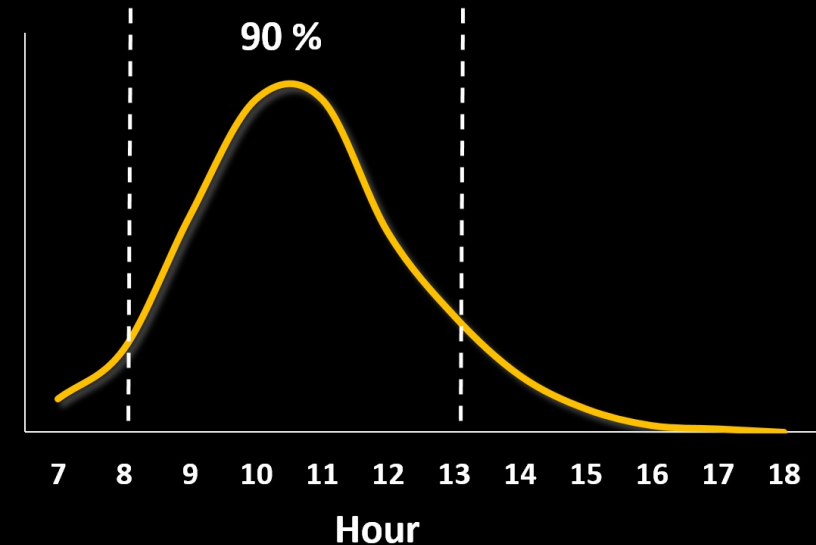


Background

- ✓ Soybean is not a classical provider of resources to bees
- ✓ Soybean was formerly known as self-pollinated and cleistogamic
- ✓ First studies started about 100 years ago, in the USA
- ✓ Last 50 years: soybean yield increments due to bee pollination demonstrated
- ✓ Global soybean area expanded 1,600 % from 1960 to 2025
- ✓ Brazil is the major producing country, cultivating ca. 50 Mha
- ✓ Last 30 years: soybean fields approached bees' repositories and apiaries
- ✓ Beekeepers started placing their hives close to soybeans
- ✓ Our group started studying the interrelation of soybeans and bees

Soybean and bees

- ✓ Bees visiting soybean flowers
- ✓ Preferred visitation time
- ✓ Attraction: volatiles production and release
- ✓ Nectar production
- ✓ Supplementary pollination and soybean yield
- ✓ Effective distance from the apiaries
- ✓ Increasing honey production



Challenges for integrating bees x soybeans

- ✓ Nesting and resources sites close to soybean fields
- ✓ Annual floral calendar
- ✓ Brazilian Forest Code
- ✓ Bee friendly soy production systems
- ✓ Beekeeping management systems



Good practices

- ✓ Agricultural:
 - ✓ IPM, biological control, resistant varieties, technology application, etc.
- ✓ Beekeeping
 - ✓ Location of apiaries, queen substitution, sanitary condition
- ✓ Communication
 - ✓ Beekeepers and growers should maintain permanent and transparent dialog, consult only trustable sources

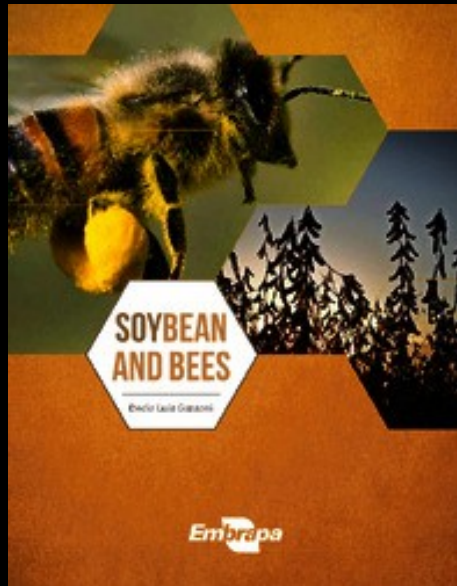
Validation

- ✓ We followed clusters growers and beekeepers
- ✓ Three different locations in Brazil, during 2 seasons
- ✓ Observing an average of 9 clusters/state/season
- ✓ Growers and beekeepers committed to follow GP
- ✓ Result: no bee mortality (feral or managed) or sub lethal effects



Technology transfer and communication

- ✓ Training courses
- ✓ Demonstration fields
- ✓ Book and technical articles
- ✓ Communication – traditional and social media
- ✓ Tools: booklet and distance education course





***Thank you so much
for your attention***