

## Supplemental pollination by *Apis mellifera* increased soybean yield in Brazil

Décio Luiz Gazzoni<sup>1</sup>; João Vitor Rillo Paz Barateiro<sup>2</sup>;  
Clara Beatriz Hoffman-Campo<sup>1</sup>; Guilherme Julião Zocolo<sup>3</sup>

<sup>1</sup>Embrapa Soja, Londrina, PR, Brasil. decio.gazzoni@embrapa.br; <sup>2</sup>Universidade Federal de Lavras;  
<sup>3</sup>Embrapa Agroindústria Tropical

### ABSTRACT

Brazil is the major global soybean producer, with an estimated soybean area of 40 million hectares cropped in the 2021/2022 growing season. As soybean areas approach the apiaries, we have observed in recent years an increasing interest of beekeepers to migrate their beehives close to soybean fields for foraging. To investigate the effect of supplementary honeybee pollination on the soybean yield, three experiments were set up in Londrina, Brazil, to assess the yield of soybeans and their components, whose flowers were either visited or not by *Apis mellifera* Linnaeus, 1758 (Hymenoptera: Apidae). The study was developed between 2017/18 and 2019/2020 soybean growing seasons, and the treatments consisted of (1) open plots, with free access of bees; (2) caged plots with a honeybee beehive inside; and (3) caged plots completely free of bees or any other pollinator. The visitation of honeybees on soybean flowers was monitored during the soybean blooming stage (9 am, 10 am, 11 am), indicating consistent visits of bees both on open and caged plots with beehives. In both treatments, larger numbers of *A. mellifera* were observed visiting soybeans at 11 am. The average soybean yield increments in soybean produced in caged plots and open plots were 639 kg/ha (12.97%) and 274 kg/ha (5.58%), compared to caged plots without a beehive, considering the overall mean of the three years of study. It was observed that the yield increments were mainly associated to the occurrence of more pods with 3 or 4 seeds, a larger number of seeds per pod, and higher seed weight. A smaller number of pods with zero or one seed on treatments with the presence of bees was also observed compared to the caged plots without bees. These results indicate that supplemental honeybee pollination may increase soybean yield under similar growing conditions, thus reducing the need for expanding area, resulting in a more sustainable soybean production system.

**KEY-WORDS:** Productivity; Yield components; Bees

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