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Honeybees: alternative to increase the yield and quality of canola oil for biodiesel production in Brazil

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Background

Current demand for vegetable oils and research to develop knowledge on management of alternative crops aiming at biodiesel production is becoming increasingly widespread in Brazil (Parente, 2003). In this context the canola cropping area is gradually increasing in the country driven by the opportunity of growing a second oilseed crop in the same year as well as due to the excellent quality of its oil associated to its fatty acid composition for either, human consumption or biodiesel (Cunha, 2007; Tómm, 2007; Marjanovic-Jeromela *et al.*, 2008). Southern Brazil has excellent soil and climatic conditions for canola production. However, average yields (around 1500 kg.ha⁻¹) are well below the potential yield of the crop (4500 kg.ha⁻¹). Canola has been classified as a self-compatible plant. In spite of that, studies have shown that cross-pollination between flowers, especially when performed by *Apis mellifera*, can increase grain yield and farmers income, raising interest on the possibility of its management (Free, 1993; Sabbahi & Oliveira, 2005; Abrol, 2007; Rosa *et al.*, 2010). Little is known about possible effect of that on canola oil yield and quality.

Objectives

This study aimed to compare yield and quality of canola oil under different pollination conditions in a commercial field in Southern Brazil.

Methods

The field experiment was carried, with three replicates, in 2007. The oil analysis were performed at the Federal University of Ceará from grain produced under three management treatments during flowering: (A) xenogamy (manual cross pollination), (B) free insect visitation (natural conditions), and (C) without presence of insects or interference with pollination. Ether extract (%) and gross energy (kcal.kg⁻¹) were estimated, respectively, by the Soxhlet method with hexane, and using an adiabatic calorimetry bomb. Comparisons of the averages of the parameters were carried by the Kruskal-Wallis test for nonparametric data, with Mann-Whitney *a posteriori* procedure, using the software Statistica 7.0.

Results

Both, ether extract (%) and gross energy (kcal.kg⁻¹) were higher on seeds produced under manual cross pollination (Table I). The percentage of ether extract under manual cross pollination differed significantly from the other treatments and gross energy did not. Although statistical difference was observed only in the percentage of ethereal extract, the absolute values of both parameters were higher in the manual cross pollination treatment in relation to the other ones.

Table I. Yield and quality of canola oil according to treatments.

Treatment	Ether extract (%)	Gross energy (kcal.kg ⁻¹)
Xenogamy	43,08 0,70a	± 7.628,83 626,27a
Free insect visitation	33,83 8,21b	± 7.438,64 500,00a
Without interference	31,98 3,67b	± 7.559,56 722,48a

Conclusion/Application to practice

Increasing the concentration of oils in agricultural products for biodiesel production is a key objective. The importance of the canola crop in Brazil is growing and the Brazilian government has introduced policies to encourage farmers to grow canola and other oilseed crops. Therefore knowledge and improvement on the management and use of *A. mellifera* in canola crops to raise the yield and quality of its vegetable oil for biodiesel production has potential, as shown in this study, and requires further work

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