



## HONEY ECONOMIC VALUATION IN THE STATE OF GOIÁS: CONSERVATION AND INCOME

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### ABSTRACT

Goiás State is not prominent on the national scene of beekeeping, even with climate, topography and vegetation appropriate for the activity. However, in recent years honey production has been growing, emerging as an alternative for the diversification of income and even main activity in rural properties. So the aim of this work is characterized the economic environment and the dynamics of honey production in the State of Goiás. The annual productions of honey in the State of Goiás on the periods from 1998 to 2013 were obtained using data from the Institute of Statistics Mauro Borges. Honey prices (per ton) in different years were obtained from different values defined by Sectoral House of Honey and Bee products. Honey production in the Goiás generated in the last 16 years (1998-2013) about R \$ 21 million. Every year honey production moves R\$ 2 million reais only with the value of the product, not counting other components of the productive chain of honey. The price of a kilogram of honey has increased by over 207% in the Goiás between the years 1998 to 2013 have honey production increased about 308%. The value of honey stimulating honey production increased in the last 16 years in the Goiás. The production of honey in Goiás state should continue to grow in coming years, but the amount paid to the product should have its stabilized price.

**KEYWORDS:** beekeeping, honey production, family farms, Orizona.

### RESUMO

O Estado de Goiás é pouco expressivo no cenário nacional de produção apícola, mesmo apresentando clima, relevo e vegetação adequados para a atividade. Porém nos últimos anos, a produção de mel vem crescendo, surgindo como alternativa para a diversificação de renda e até mesmo atividade principal nas propriedades rural. Assim o objetivo deste trabalho é caracterizar o cenário econômico e a dinâmica da produção de mel no Estado de Goiás. As produções anuais de mel no Estado de Goiás dos períodos de 1998 a 2013 foram obtidas por meio dos dados do Instituto Mauro Borges de Estatística. Os preços do mel (por tonelada) nos diferentes anos foram obtidos a partir de diferentes de valores definidos pela Câmara setorial de Mel e produtos apícolas. A produção de mel no Estado de Goiás gerou nos últimos 16 anos (1998 – 2013) cerca de R\$21 milhões de reais. Anualmente a produção de mel movimentava R\$2 milhões de reais somente com o valor do produto, sem contar com outros componentes da cadeia produtiva do mel. O preço do quilo do mel aumentou

mais de 207% no Estado de Goiás entre os anos de 1998 a 2013, já a produção de mel aumentou cerca de 308%. O valor do mel estimulando a produção do mel cresceram nos últimos 16 anos no Estado de Goiás. A produção de mel no Estado de Goiás deverá continuar a crescer nos próximos anos, porém o valor pago ao produto deverá ter seu preço estabilizado.

**PALAVRAS-CHAVE:** Apicultura, produção de mel, produção familiar, Orizona.

## INTRODUCTION

The beekeeping is a traditional activity associated with human history. Since 2400 years BC, the Egyptians began to put bees in clay pots. Thus, the man begins to create and transport the bees in order to keep available the production of honey for consumption.

The creation of *Apis mellifera* L., or bee, arose in Brazil around 1840, with bees originated in Spain and Portugal, brought by Father Antonio Carneiro. Already in the mid-1950s was the introduction of Africanized bees, even with scientific controversies, improved the quality of bees, allowing the expansion and growth of activity in the country (PEREIRA et al., 2003).

Brazil is featured honey production in the world stage, being among the countries where beekeeping fastest growing. In 2013, the country produced about 35,364 tonnes of honey, being among the 15 largest producers of honey. Within the country, the South accounts for 49% of the country's honey production. Already Northeast and Southeast, representing 18% and 17% respectively of honey production. Therefore, among all Brazilian States, only nine states together account for over 84% of the national production of honey (SEBRAE, 2014).

The State of Goiás does not stand out on the national scene of beekeeping, even with climate, topography and vegetation appropriate for this activity. In recent years honey production has been growing, emerging as an alternative for the diversification of income and even main activity in rural properties (GOIÁS, 2015). In addition to the growth, beekeeping is seen as an economic activity with social and environmental characteristics, since it generates income for farmers and allows the action of bees in the ecosystem services, generating indirect gains with pollination of crops and native plants (BIZOTTO & SANTOS, 2015; GIANNINI et al., 2015). Thus, this study aimed to characterize the economic environment and the dynamics of honey production in the State of Goiás.

## MATERIAL AND METHODS

### Production and value of honey

The annual production of honey (PROD) in the Goias State of the periods from 1998 to 2013 were obtained using data from the Institute Mauro Borges of Statistics (2015). Honey prices (per tonne) in different years were obtained from different values defined by Sectoral House of Honey and bee products (CSMA, 2015). To define the totals the following equations were used - adapted GALLAI & VAISSIERE (2009):

$$V_{totali} = V_{year1} + V_{year2} + \dots + V_{yeari}$$
$$V_{year} = PROD * P$$

Vtotali - Honey value throughout the study period.

Vyear - Honey Value in the year.

PROD - Honey production per year tonne (ton).

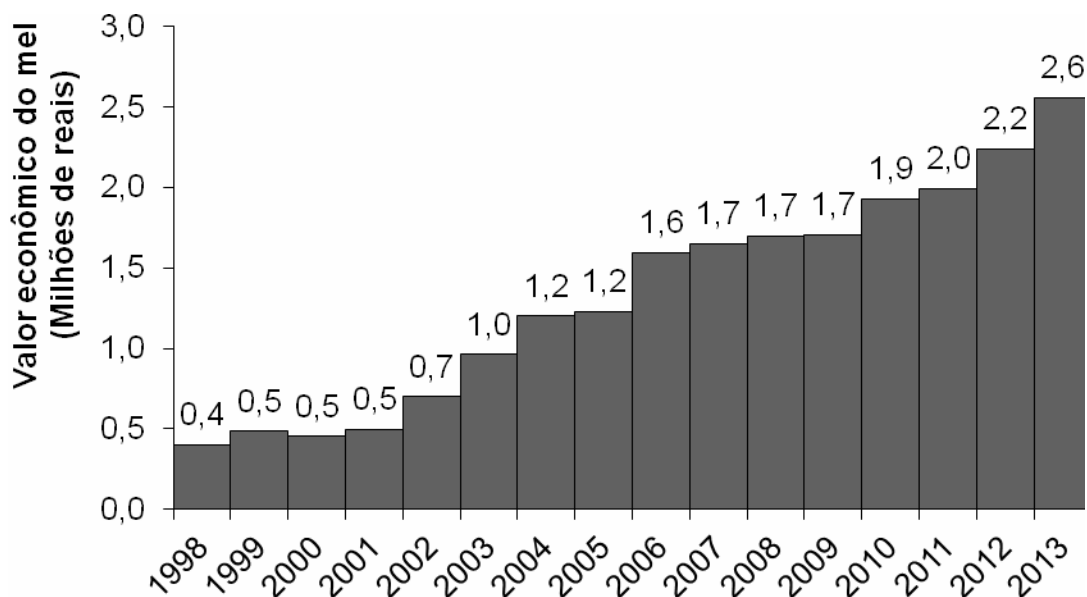
P- Honey ton price in the year (R\$ - Reais).

To evidence the relationship between amount of honey produced and the amount of honey in the year was conducted a quadratic regression with a 99% significance level. To check the fit of the data equation was observed the regression coefficient ( $R^2$ ) and the distribution of the residuals.

## RESULTS AND DISCUSSION

Honey production in Goiás State generated in the last 16 years (1998-2013) around R\$ 2.130.611 reais. Every year honey production moves R\$ 2.505.954 reais only with the value of the product, not counting other components of the productive chain of honey and propolis, beehives, etc. In the interval from 1998 to 2013, the amounts collected with honey production increased by almost seven times, mainly due to the increase in honey production and the optimization of product on the market (Figure 01).

The price of a kilogram of honey increased by about 207% in the Goiás State between the years 1998 to 2013, since honey production increased about 308% over the same period. The honey production climbing was strongly in 2005, when production of honey increased by 125%, driven by the increase in the price of the product that has almost doubled (due to the high value of the dollar against the real) between the years 2002 to 2003, thus stimulating investment in new hives, improvement and increase of beekeeping in the state.



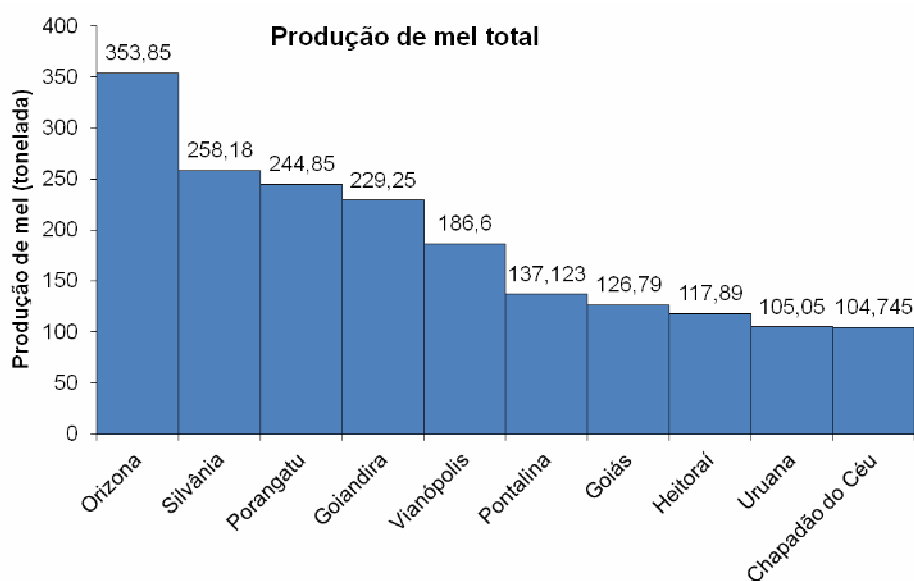
**FIGURE 01.** Economic value of honey produced in the State of Goiás in the years 1998-2013 (y: Honey economic value; x: years;  $y = 0,1433x + 0,113$ ;  $R^2 = 0,9719$ ,  $p > 0,01$ ).

The State of Goiás not has significant honey production on the national scene, but production growth is considerable and can stand out among the other states in the future. In Goiás, municipalities that are historical highlights in beekeeping match: Orizona, Silvânia, Porangatu, Goiandira, Vianópolis, Pontalina, City of Goiás,

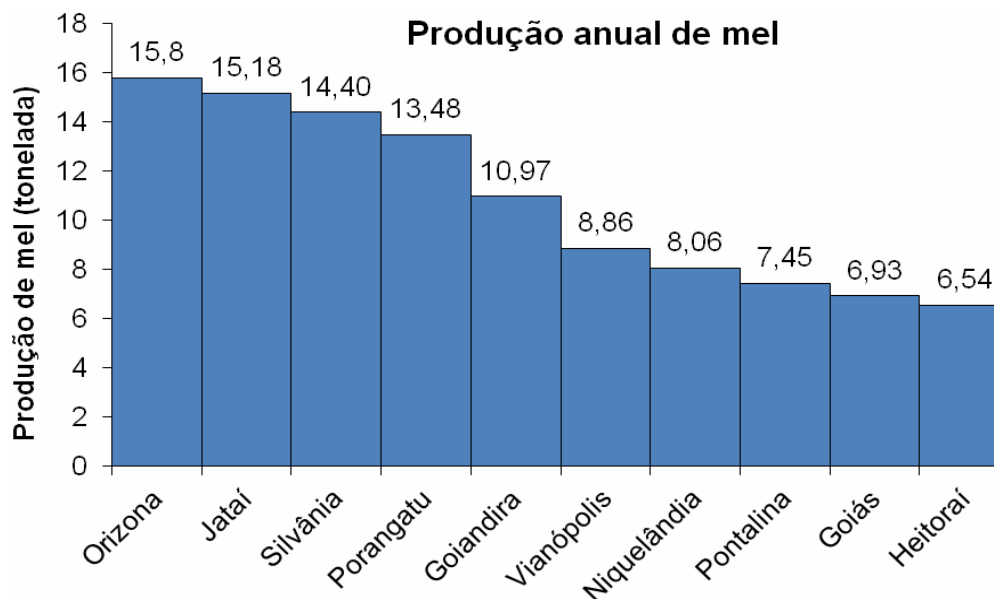
Heitorai, Uruana and Chapadão do Céu, which are the largest producers in the last 16 years, unbeliever in order (Figure 02).

In relation to average annual production, other municipalities are also featured in the production: Orizona, Jataí (with increase in recent years), Silvânia, Porangatu, Goiandira, Vianópolis, Niquelândia (also with an increase in recent years), Pontalina, City of Goiás and Heitorai also on average production unbeliever order of honey per year. The ten cities that produce more honey in the state account for nearly 44.6% of the state production, reflecting once production is concentrated in a few locations (Figure 03).

The relationship between honey production in the Goiás state and the amount paid to the producer per kilogram also showed significant ( $p < 0.000$ ), and verified positive relationship between the amount paid and the production of honey ( $R^2 = 0.79$ ,  $y = - 19,64x^2 + 282,1x - 677$ ) (Figure 04). In the initial stage of honey production and beekeeping, the amount paid to producers for honey is crucial as incentives for increased production. Still, the rise in prices is expected to remain stable between R \$ 6.00 and R \$ 7.50, but according to the volume of honey produced in the coming years, the value may be reduced due to the increase of product offering, reducing amounts paid to producers.



**FIGURE 02.** Total production of honey from 1998 to 2013 of honey a municipality in the state of Goiás;

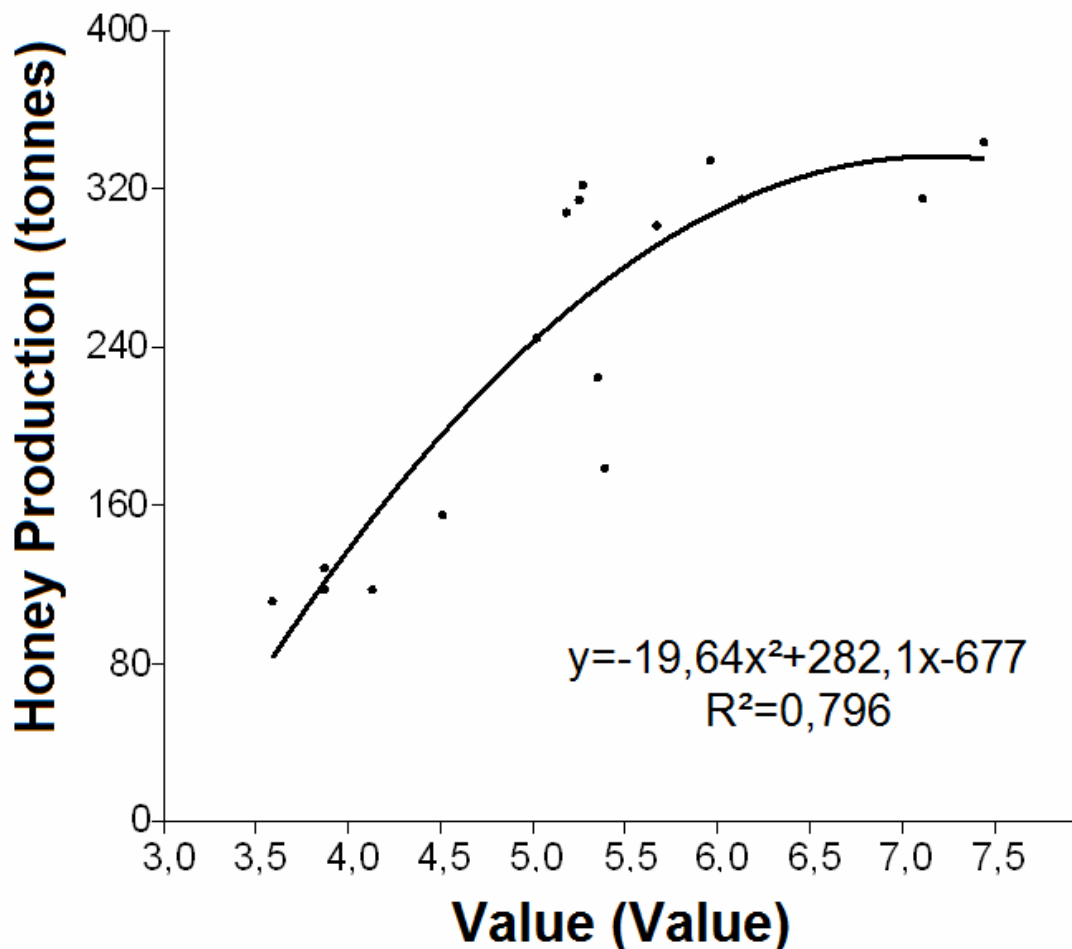


**FIGURE 03.** Average annual production (1998 to 2013) of honey per municipality in the State of Goiás.

In addition to the local investment and organization of producers for the production of honey, it is worth noting the bee ability of each region. The land use and activities in the vicinity of the apiary locations are factors that can compromise the quantity and quality of the honey produced (WOLFF et al., 2006; MOURA et al., 2014; DAMASIA-GOMES et al., 2015). Among the municipalities of Goiás, many have intense agricultural activity with temporary crops and high impact on natural resources, and few have alternative sustainable activities with less impact on natural resources.

Beekeeping, among agricultural activities, is considered sustainable alternative for income generation and use of natural resources in an unconventional way, since it can be used in alternative spaces. It also enables the utilization of native vegetation as a food resource and for installation of the colonies, not using areas considered productive for crops such as soybeans, corn, beans and sugarcane (ALMEIDA & CARVALHO, 2009; KHAN et al., 2009).

Another relevant aspect is the beginning of the creation of bees to farmers. At first, there is a perception that the activity is secondary. However, with the right technology investments, organization for production and marketing of honey and technical assistance, beekeeping comes to occupy the position of main activity in the generation of income in many properties (BOTH et al., 2009; BARBOSA & SOUZA, 2013; OLIVEIRA et al., 2013).



**FIGURE 04.** Relationship between honey production (real) and amount paid (per kilogram) in the Goiás state (y: Honey production in tonnes; x: amount paid by the kilo of honey;  $y = -19,64x^2 + 282,1x - 677$ ;  $R^2 = 0.796$ ;  $F = 25.50$ ,  $p = 0.000$ ).

The main points related to the environmental benefits of beekeeping are low-impact activity; action pollinating bees increases the productivity of various crops and cultures beyond the native plants (RIBEIRO et al., 2015.); promotes the preservation of biodiversity, since the plants area being pollinated and swapping genetic material, increasing its variability (MELO-SILVA et al., 2013); assist in the recovery of degraded areas, because the pollinated species produce more seeds, contributing to natural regeneration (MORANDIN & Kremen, 2013; SORDI & SHLINDWEIN, 2014). The beekeeping also assists in spreading environmental awareness among producers and population, especially on issues such as conservation of forest fragments, which provide food and shelter for bees and the use of pesticides, to which bees are very sensitive (GALLAI & VAISSIERE, 2009; FAO, 2013; SORDI & SHLINDWEIN, 2014).

Already the main points related to the social benefits of beekeeping correspond to the generation of income and employment for farmers, resulting in maintaining people in the countryside and reducing the rural exodus and the creation of jobs throughout the beekeeping supply chain, with prospects development associations, cooperatives and other social organizations, which favors the equitable distribution of the gains from the activity (SORDI & SHLINDWEIN, 2014).

Another important aspect of beekeeping is that household production corresponds to much of the bee breeders in Brazil, with the appropriate activity for the family system (BARBOSA & SOUSA, 2013; OLIVEIRA et al., 2013; BOTH & BOTH, 2009). However, honey production with fewer workers limits the number of hives to be handled and thus the production of honey, the ideal number between 100 and 200 hives (SABBAG & NICODEMO, 2011).

According FREITAS et al. (2004), trained beekeepers have higher productivity of hives compared to untrained. The field of management techniques beekeeping, swarms and proper maintenance reflected in the production of crops even in the long term. Among the strategies for recovery of beekeeping supply chain is product diversification, taking advantage of the various options produced in the hive such as propolis, pollen, bee colonies, combs and the honey itself. Another aspect to consider is the production of organic products and approvals related to compliance, quality and environmental, further enhancing the final product.

As well it is essential that the beekeepers of Goiás performs the proper management of apiaries with qualified service personnel to seek technical and technological improvements, combined with research aimed at improving the quality and quantity of production. Future studies sanity, handling bees, honey harvesting and postharvest may improve the production in Goiás, bringing the state's role in the national beekeeping scene.

## CONCLUSION

Honey production in the Goiás State generated in the last 16 years more than 21 million reais with an annual average above 2.5 million. The main cities in the State of Goiás in economic gains with honey are: Orizona, Silvânia, Porangatu and Goiandira. The amount paid to honey, grown over the past 16 years in the Goiás state. The honey production should continue to grow in next years, but the amount paid to the product should have a stabilized price.

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