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# Alternative supplements affect the royal jelly quality produced by Africanized honeybees

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## Introdution

For royal jelly synthesis the workers, to ensure their production, require complement with artificial supplements. The aim of this study was evaluate the effect of supplements in physico-chemical composition and microbiological of royal jelly produced by Africanized honeybees.

## Materials and methods

In each test the colonies were divided in four groups, one control and three in which supplements were evaluated (Table 1 and Figure 1).

***Table 1.*** **Treatments and supplements tested**

| TREATMENTS | | | |
|---|---|---|---|
| **Groups (five colonies)** | | **Supplement** | **Number of colonies** |
| **Test I** | **1** | Linseed oil, palm oil, beer yeast and isolated soybean protein | 15 |
| | **2** | Linseed oil | 15 |
| | **3** | Palm oil | 15 |
| | **Control I** | No proteic supplement | 15 |
| **Test II** | **4** | Beer yeast and isolated soybean protein | 15 |
| | **5** | Isolated soybean protein | 15 |
| | **6** | Beer yeast | 15 |
| | **Control II** | No proteic supplement | 15 |

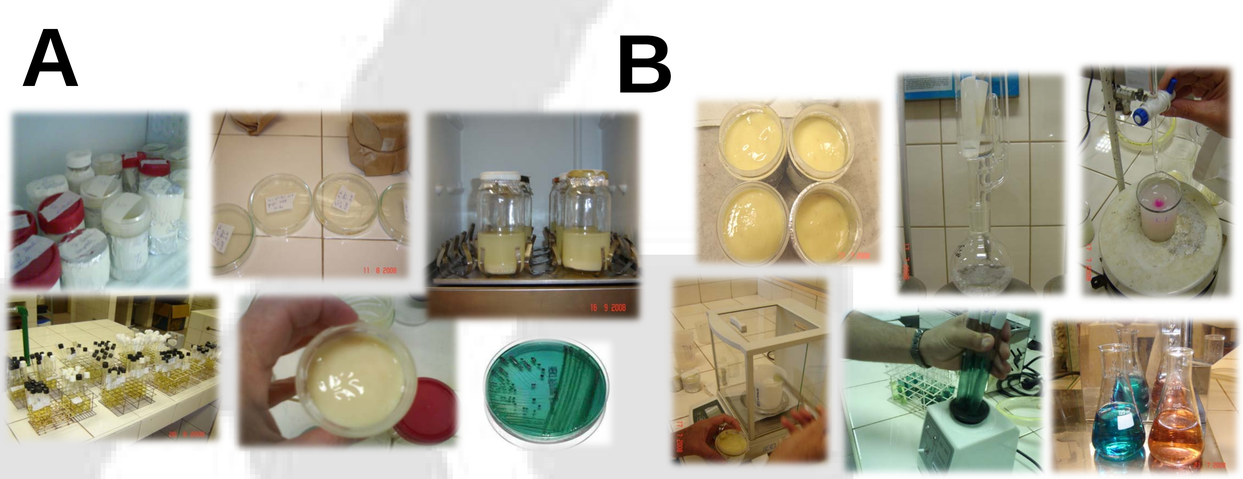


***Figure 1.*** Samples available for microorganism level (A) and physico-chemical parameters analyzed

The royal jelly samples were studied for microorganism level, in 25g following the international standards of APHA (Compendium of Methods for the Microbiology Examination of Foods, 1992), and physico-chemical parameters were analyzed (Figure 1).

## Results

***Table 2.*** Microorganism level of royal jelly samples (25 g). Mean and pattern by brasilian legislation in nubmer of coliforms in 35ºC and 45ºC (NMP.g$^{-1}$), yeast and e leveduras (UFC.g$^{-1}$) e *Salmonella spp* (25g)

| ****Source of variation** | **Coliforms in 35ºC (NMP.g$^{-1}$)** | **Coliforms in 45ºC (NMP.g$^{-1}$)** | **Yeasts and molds (UFC.g$^{-1}$)** | ***Salmonella spp* (25g)** |
|---|---|---|---|---|
| **1** | <3 | <3 | < 10$^1$ | Absent |
| **2** | <3 | <3 | < 10$^1$ | Absent |
| **3** | <3 | <3 | < 10$^1$ | Absent |
| **4** | <3 | <3 | < 10$^1$ | Absent |
| **5** | <3 | <3 | < 10$^1$ | Absent |
| **6** | <3 | <3 | < 10$^1$ | Absent |
| **Control** | <3 | <3 | < 10$^1$ | Absent |
| ***Mean (UFC.g$^{-1}$)** | <3 | <3 | < 10$^1$ | Absent |
| **F value** | ns | ns | ns | ns |
| *****Standard** | <3 NMP.g$^{-1}$ | <3 NMP.g$^{-1}$ | 100 UFC.g$^{-1}$ | Absent/25g |

**Averages followed by equal letters in the same column did not differ statistically between them (t test, p>0.05) *Average of samples (confidence interval 95%)**

***Table 3.*** Physico-chemical parameters analyzed: pH, acidity (meq.kg-1), humidity (%), reducing and total sugars (%), protein (%), ash (%) and lipids (%)

| ****Source of variation** | **pH** | **Acidity (meq.kg$^{-1}$)** | **Humidity (%)** | **Reducing sugar (%)** | **Total sugar (%)** | **Protein (%)** | **Ash (%)** | **Lipid (%)** |
|---|---|---|---|---|---|---|---|---|
| **1** | 3,98a | 20,13ab | 66,69a | 10,52$^a$ | 14,96a | 14,24a | 0,66b | 3,45a |
| **2** | 3,94a | 20,70ab | 66,93a | 12,26d | 15,05a | 13,80a | 0,81a | 3,41a |
| **3** | 3,99a | 20,00a | 67,01a | 9,69ab | 14,38a | 14,35a | 0,79a | 3,03a |
| **4** | 3,98a | 20,13ab | 66,69a | 10,52$^a$ | 14,96a | 14,24a | 0,66b | 3,45a |
| **5** | 3,97a | 21,50c | 67,08a | 7,94c | 13,98a | 14,43a | 1,08abc | 3,43a |
| **6** | 3,96a | 20,83bc | 67,32a | 8,92b | 14,31a | 14,47a | 0,95a | 3,18a |
| **Control** | 3,99a | 20,00a | 67,58a | 10,25$^a$ | 14,03a | 13,98a | 0,82a | 3,59a |
| ***Mean (min. and max.)** | 3,97 (3,92-4,02) | 20,47 (20,0-21,5) | 67,04 (66,23-67,81) | 10,01 (7,35-12,44) | 14,52 (15,14-13,96) | 14,21 (13,11-14,77) | 0,82 (0,39-1,15) | 3,36 (2,13-5,80) |
| **DP** | ±0,03 | ±0,58 | ±0,43 | ±1,33 | +0,42 | ±0,41 | ±0,22 | ±0,41 |
| **SV (%)** | 0,76 | 2,83 | 0,64 | 13,28 | 2,96 | 2,89 | 26,83 | 12,20 |
| **F value p=** | 1,50 0,2544 | 14,30 0,0001 | 2,40 0,08148 | 46,46 0,0001 | 106,1 0,0001 | 1,43 0,2598 | 1,8862 0,1538 | 0,5221 0,7813 |
| *****Default** | 3,4-4,5 | 23-53 | 60-70 | 10,0 (min.) | 15 (max.) | 10,0 (min.) | 1,5 (max) | 3,0 (min.) |

**Averages followed by equal letters in the same column did not differ statistically among them (t test, p>0.05) *Average of samples (confidence interval 95%)**

## Conclusion

All results were according to the quality patterns established by *Brazilian* legislation. It was not observed dependence among physico-chemical and microbiological composition of royal jelly samples analyzed and types of supplement assessed.

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