



## Seasonal impacts on the sperm characteristics of Africanized honeybee drones (*Apis mellifera* L.) reared in the Caatinga biome

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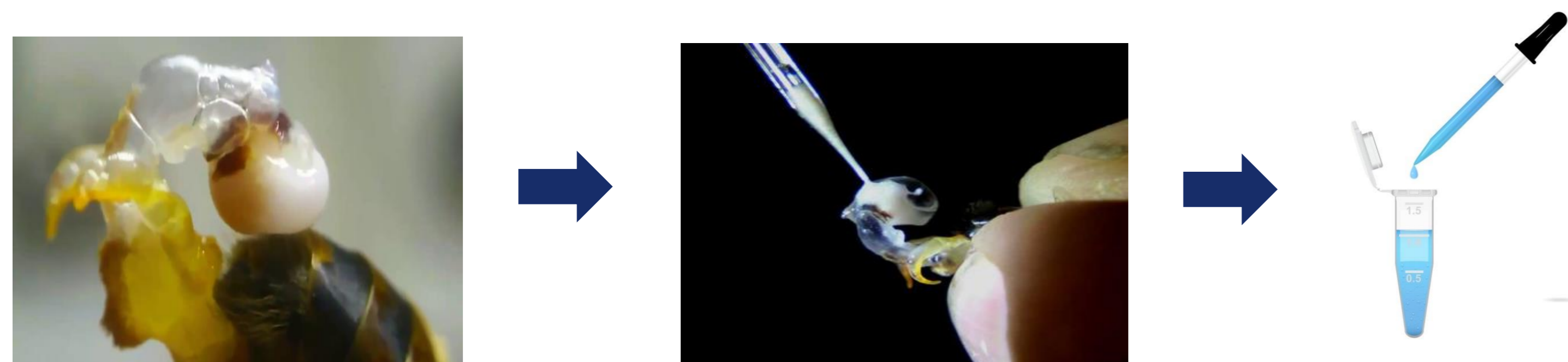
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### 1. INTRODUCTION

This biome is characterized by the scarcity of rain and high temperatures, which have been provoking the abandonment of the colonies. Since honeybee drones are fundamental for the reproductive success of the colony, we aim to investigate the impacts of dry and rainy seasons of the Caatinga biome on the sperm characteristics of Africanized honeybee drones.

### 2. MATERIAL AND METHODS

Study was conducted during the peak of rainy (March – June 2018) and dry (October – December 2018) periods of the semiarid climate in the Caatinga. A total of 100 Africanized honeybee (*A. mellifera*) drones, aging approximately 12 days old, were used in the experiment, being 50 obtained during dry season and 50 during rainy season.



Each drone was trapped by the head and chest region, with its abdomen being pressed gently resulting in the eversion of the endophallus, for later extraction with aluminum forceps. This structure was macerated using tweezers in 20  $\mu$ l of 0.9% sodium chloride saline. Then sperm indicators were analyzed such as viability, motility, concentration, morphology and morphometry. Data were presented as means and SEM and compared between seasons by variance analysis followed by Tukey test ( $P < 0.05$ ).

### 3. RESULTS AND DISCUSSION

During rainy season, samples presented higher values ( $P < 0.05$ ) for sperm concentration ( $3.8 \pm 8.0 \times 10^6$  sperm/mL vs.  $3.0 \pm 6.6 \times 10^6$  sperm/mL), motility ( $85.6 \pm 1.5\%$  vs.  $52.0 \pm 2.9\%$ ) and membrane integrity ( $82.8 \pm 1.9\%$  vs.  $70.9 \pm 1.8\%$ ) than those observed at the dry season (**table 1**).

**Table 1.** Mean values ( $\pm$  SEM) for sperm concentration, motility, and membrane integrity of honeybee drones ( $n = 100$ ) collected during dry (October – December 2018) and rainy (March – June 2018) seasons at the Caatinga biome.

Sperm parameters	Rainy season	Dry season
	Mean $\pm$ SEM	Mean $\pm$ SEM
Concentration ( $\times 10^6$ /mL)	$3.8 \pm 8.0^a$	$3.0 \pm 6.6^b$
Motility (%)	$85.6 \pm 1.5^a$	$52.0 \pm 2.9^b$
Membrane integrity (%)	$82.8 \pm 1.9^a$	$70.9 \pm 1.8^b$

<sup>a,b</sup> Superscript lowercase different letters represent statistical differences in the same row ( $p < 0.05$ ).

However, higher values ( $P < 0.05$ ) for normal sperm morphology were found during dry ( $36.6 \pm 1.8\%$ ) than at the rainy ( $30.8 \pm 2.3\%$ ) season. Regarding sperm morphometry, sperm presenting higher dimensions ( $P < 0.05$ ) were found at the rainy season ( $262.92 \pm 1.2 \mu\text{m}$ ) in comparison to those evaluated during dry season ( $252.24 \pm 4.1 \mu\text{m}$ ). It was possible to identify that the sperm of *A. mellifera* drones have shape, dimensions and structures similar to other hymenoptera, being characterized as a filamentous cell with the same head and tail.

### 4. CONCLUSION

In summary, Africanized honeybee drones raised in Caatinga biome seems to present a seasonal variation related to its sperm parameters. This information will be useful for the development of strategies to improve the reproductive management of the honeybee colonies reared in regions with semiarid climate.

Acknowledgements:

