TOPOCLIMATIC CONDITIONS AND NATURAL OCCURRENCE OF *COPAIFERA* SPP. TO SUPPORT THE INCLUSION OF SPECIES IN FOREST ARRANGEMENTS IN THE STATE OF PARA, BRAZIL

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INTRODUCTION

The species of genus *Copaifera* produce oleoresin but only a few have the potential for commercial-scale production and the high market demands of the fragrance and perfume industry, as well as for the traditional herbal medicines from the Amazon rainforest. The *Copaifera* oil presents anti-inflammatory and antibacterial properties and it is traditionally used for the treatment of numerous illnesses. 28 *Copaifera* species have been catalogued in Brazil (Martins-da-Silva, 2006, Martins-da-Silva et al., 2008). The following species can be found in the State of Pará: C. *reticulata*, C. *piresii*, C. *glycycarpa*, C. *duckei*, C. *martii*, C. *multijuga*. This study intends to provide the georeferencing of the natural occurrence of *Copaifera* ssp., along with an integrated topoclimatic data, to offer a high precision indication of oleoresin production areas.

MATERIAL AND METHODS

We used topography and climate data from series of thirty-year (1961-1990). This series was derived from a Climate Normals (INMET, 2009) and a global database (WorldClim), after careful adjustment for each region (Z=1.96 for 95% confidence), with spatial resolution of 3 km x 3 km (3.996 points). It has been spatialized in Arcgis 9.3 and exported to TerraView 3.2, with regular grids, covering 1,247,690.0 km² in the State of Pará, generating topoclimatic maps, with the same climate database used by MARTORANO et al. (2011). Also, the local natural occurrence data is part of the studies that generated the Doctoral Thesis of Martins-da-Silva (2006).

RESULTS AND DISCUSSION

The species C. *duckei* is mainly found in the northeast region of the State of Pará, under topothermal conditions such as: temperature between 25.9 to 26.4°C, total annual rainfall between 2,160 and 2,835 mm, with a water deficit that is less than 150 mm and elevations below 200m. C. *reticulata* and C. *martii* present the ability to adapt to topoclimatic factors. They are found in a broad range for altitudes, temperature, and water deficit (see Figure 1 and 2). C. *multijuga* is naturally located in the far west of the State, presenting specific environmental conditions. Additionally, the species C. *piresii* is found in high lands in the South region of Pará, within a delimited range of temperature (23.3 to 24.3°C), with water deficit under 120 mm, as indicated by the circles in Figures 1 and 2. These specific features The specificity may provide a subside for the planning forest and collection. The topoclimate specificity may enable the inclusion of these species in forest planting arrangements to support the Pharmacology centre in the Amazon region; it may support the creation of a Local Productive Arrangement (LPA) for a Copaifera supply chain. In addition, the present research is able to propose a "Controlled Origin Label" to ensure an added value for the oleoresin market.

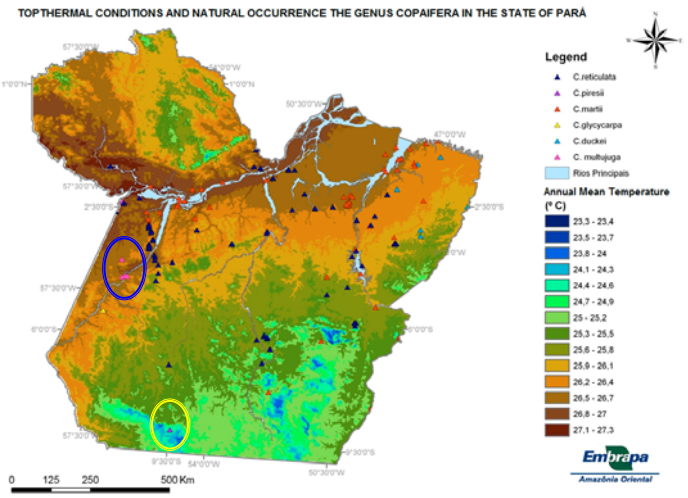

Figure 1. Topothermal conditions and the natural occurrence of Copaifera in the State of Pará

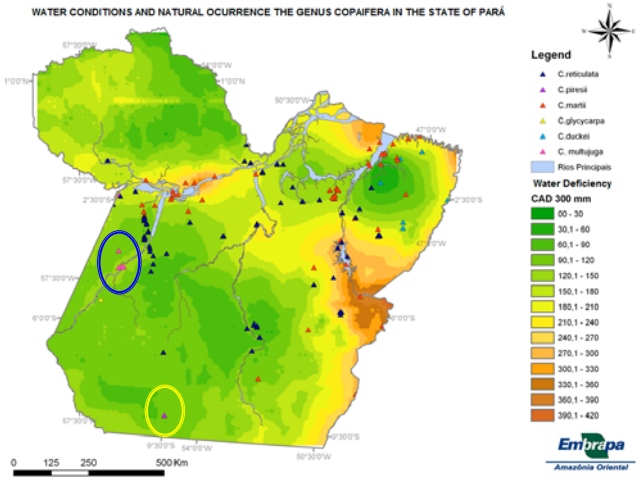

Figure 2. Water deficit and the natural occurrence of Copaifera in the State of Pará

CONCLUSIONS

In comparison to other species, C. reticulata and C. martii presented a higher ability to adapt to adverse topoclimatic variation. *C. piresii* and *C. multijuga* are differentiated in terms of topoclimate conditions since they can only occur in extremely specific locations. Such characteristics can, at the same time, add value to the oleoresin market in the Amazon but on the other hand it may be endangered for the driving-forces of deforestation or for climate changing conditions.

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