STUDY OF CLIMATE SUITABILITY FOR CULTIVATION OF RUBBER IN SILVOPASTORIL SYSTEMS

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Introduction

With increasing global demand for natural rubber, many regions have sought to expand the cultivation of *Hevea brasiliensis (Willd. Ex A. Juss.) Müll. Arg.* (Rubber), including the state of Espírito Santo, Brazil. For this expansion the study of potential areas is necessary, therefore, this paper presents the methodology used for determining the areas suitable to rubber planting in silvopastoral systems using GIS from the analysis of the annual and monthly average climatic elements air temperature (T), precipitation (P), evapotranspiration (ETR) and water deficit (DEF).

Materials and methods

For this work, the average monthly rainfall data of 92 rainfall and/or weather stations were used, with a range minimum 20-year history, belonging to INCAPER, INMET, CPTEC and ANA, covering the state of Espírito Santo (Figure 1).

The average air temperature data were obtained from the estimation equation derived from the multiple linear regression analysis developed for the region for Feitoza *et al.* (1979) using the independent variables latitude, longitude and distance from the coast and spatially using GIS.

To quantify the climatic water balance monthly data average rainfall and average temperature estimates were used, estimated the climatic parameters of potential evapotranspiration, actual, water storage in the soil, accumulated negative, water change in soil water deficit and water surplus.

The zoning of climate suitability *Hevea brasiliensis* for the state of Espírito Santo, was based on the requirements of the species in relation to the elements (Table 1) and using the IDW2 interpolation method (Inverse Distance to power 2) to give the thematic maps of each element, which maps algebra were applied to the multiplication of the same.

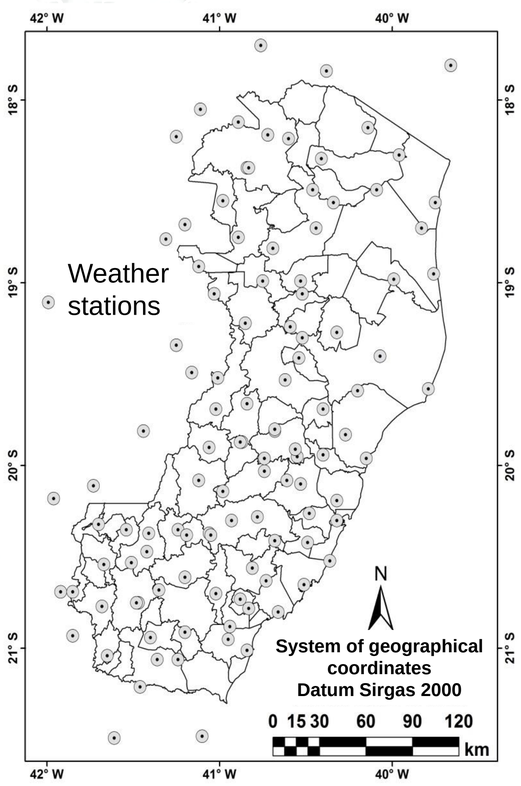

Figure 1: Location of rainfall and/or weather stations used in data collection in the Espírito Santo and surrounding municipalities.

Table 1: Climatic requirements of *Hevea brasiliensis* for the State of Espírito Santo.

Parameters climate (annual)	Suitability classes		
	Suitable	Marginal	Unsuitable
Average temperature (º C)	>20	16 a 20	<16
Precipitation (mm)	>1200	900 a 1200	<900
Water deficit (mm)	<150	150 a 300	>300
Actual evapotranspiration (mm)	<900	-	>900

Results and discussion

When looking at the map of Figure 2 and Table 2 generated from maps algebra described the methodology we see that the state of Espírito Santo has areas of suitability that extend throughout the state covering the entire coastal strip, a result that is due to tropical dry winter that is conducive to the cultivation of *Hevea brasiliensis* as noted by Rossman (2007). It is important to note that the northern and midwestern regions of the state, as well as the nearby city of Marataízes are marginal areas for heivicultura to be high water deficit regions. In addition to these regions, located at 600 meters above altitudes can be unsuited, marginal thermal restriction and not recommended for the risk of frost.

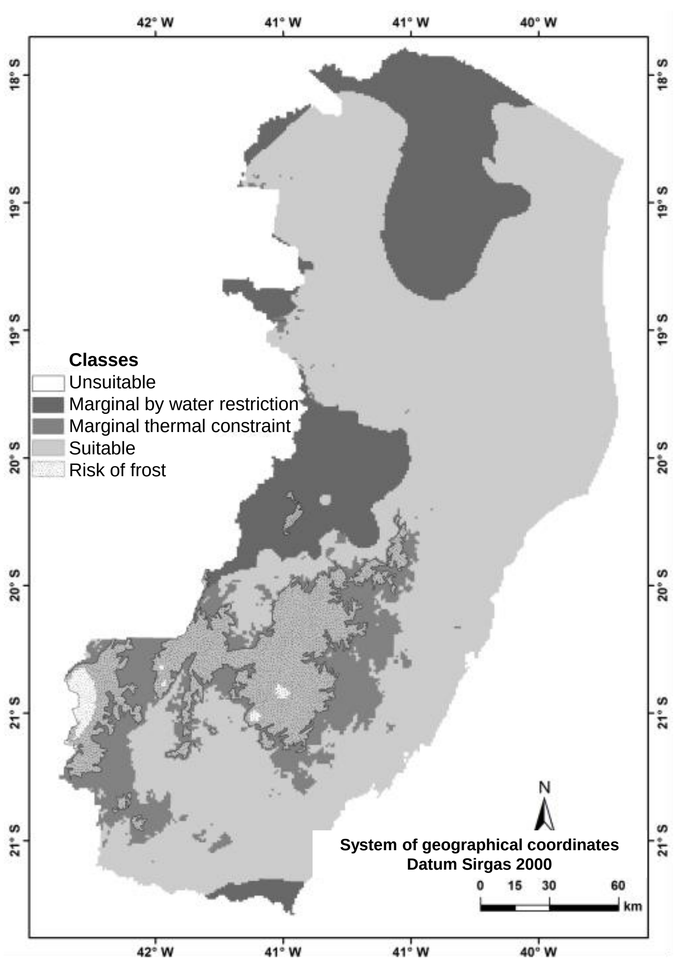

Figura 2: Mapa de aptidão climática para a seringueira no estado do Espírito Santo.

Table 2: State Areas of the Holy Spirit occupied by each suitability class culture of rubber trees.

Classes	Percentage(%)
Unsuitable	62.47
Marginal by water restriction	18.98
Marginal thermal constraint	18.02
Suitable	0.53
Risk of frost	9.1

Final considerations

Based on the analysis of the results, it is concluded that the state of Espírito Santo has a great capacity to the cultivation of *Hevea brasiliensis*, with water deficiency and the risk of frost the major limiting the cultivation of this species in some regions. Thus, according to the climate survey conducted by this study, it becomes feasible to expand the cultivation of this species to 75,000 hectares by 2025, as proposed by the state government.

For best results the constant updating of climatic zoning is required for this species, as well as a consolidation of the climate in different regions and validation of data in the field, so that we can ensure the reliability of this study.

References

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