TROZ Centre for Agriculture in the Tropics and Subtropics
Section:
Biodiversity and Land Rehabilitation in the Tropics and Subtropics

Universität **Hohenheim**

Biogeography and GIS: Case Study *Centrosema brasilianum*

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Introduction

- *Centrosema brasilianum* (L.) Benth. (Fig. 1) is a neotropical legume mainly native to Venezuela and Brazil. Because of excellent adaptation to drought and acid, low-fertility soils, it holds particular potential for pasture development for marginal conditions and further collection of wild germplasm is indicated.
- The natural distribution of the species, however, is as yet poorly documented and not well understood.
- Therefore a map of collecting sites of available germplasm with relevant climatic information, with the objective of assisting future selection and breeding work was produced.
- A further map predicting further distribution of the species in Venezuela (on the basis of germplasm and herbarium information) based on climate and soil information was created.

Fig. 1: *Centrosema brasilianum*

Materials & Methods

- Information on all known collecting sites of *C. brasilianum* germplasm was gathered and, using the GIS software FloraMap™, a map of the natural distribution of the species produced, according to climate information such as rainfall distribution.

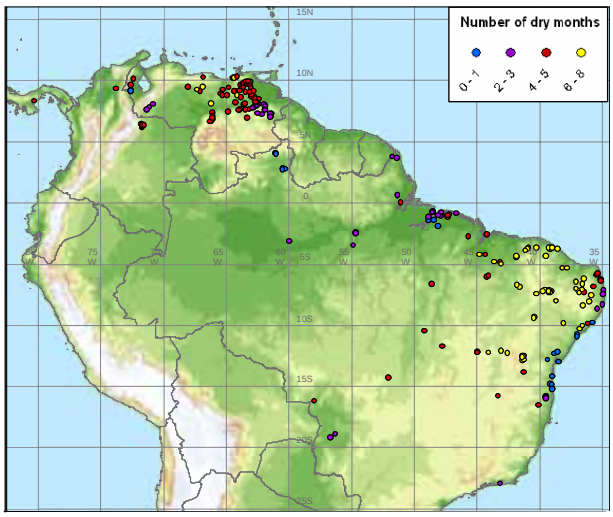

Fig. 2: Dry months levels at *C. brasilianum* collecting sites

- Collecting site data of Venezuelan herbarium specimens and germplasm accessions of *C. brasilianum* (in total 356 sites) were combined and, a map showing the actual and likely distribution of the species produced.
- Since FloraMap™ handles only geographical and climatic data, a soil map of Venezuela from the FAO Soil and Terrain Digital Database was imported and, after excluding a few unlikely soil types with expert advice, combined by means of ArcGIS™ with the predicted distribution map produced by FloraMap™; finally, a distribution prediction map considering both climate and soil data was generated.

Results & Conclusions

- *C. brasilianum* has a wide natural distribution over climatic zones in tropical America (Fig. 2). If climatic conditions at the collecting sites are indicative of plant characteristics, germplasm for instance from the driest sites could be valuable for development projects interested in drought resistance.

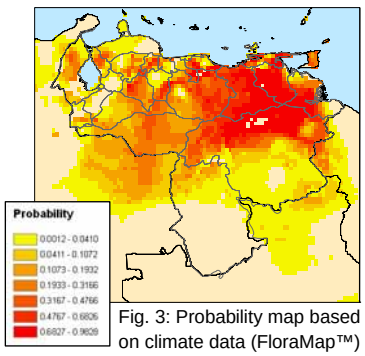

Fig. 3: Probability map based on climate data (FloraMap™)

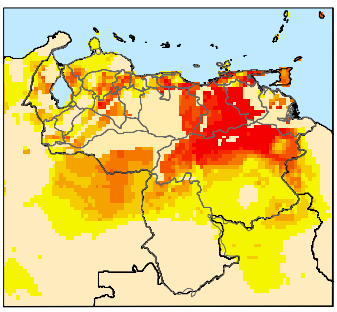

Fig. 4: Probability map combining soil and climate data

- In Fig. 3 the different probabilities of the natural distribution of *C. brasilianum* in Venezuela, calculated by FloraMap™, are illustrated. Taking into account soil conditions, the final probability map (Fig. 4), can serve to design future *C. brasilianum* collecting missions. However, this map could be further refined based on appropriate expert interpretation of available origin data (herbarium labels, gene bank databases).
- The results show that both climate and soil conditions must be considered at producing probability maps. Neglecting any of the two leads to incomplete results.
- GIS software alone is insufficient to make sensible distribution predictions. Obviously the experienced human mind is in most cases required as an indispensable supplementary aid.

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