

# A first stage of an iterative strategy for empirical spatial modelling of biomass straw in Alentejo, Portugal

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## Introduction

The Alentejo region in Southern Portugal displays a vast undulating and open rolling plain area of about 27,330 km<sup>2</sup>, with Mediterranean characteristics and agricultural property specificities in terms of significant areas of individual farms ranging up to tens or hundreds of hectares. This region is an important provider of food products based e.g. on cereal and legume cultivations aiming grain production with huge potential in terms of straw residues. Although these sub-products are mainly diverted for livestock feeding, a significant potential for straw biomass remains, particularly if one considers that e.g. leguminous plants are not so tasty for cattle.

## Material and Methods

The spatial datasets used in suitability crop mapping were:

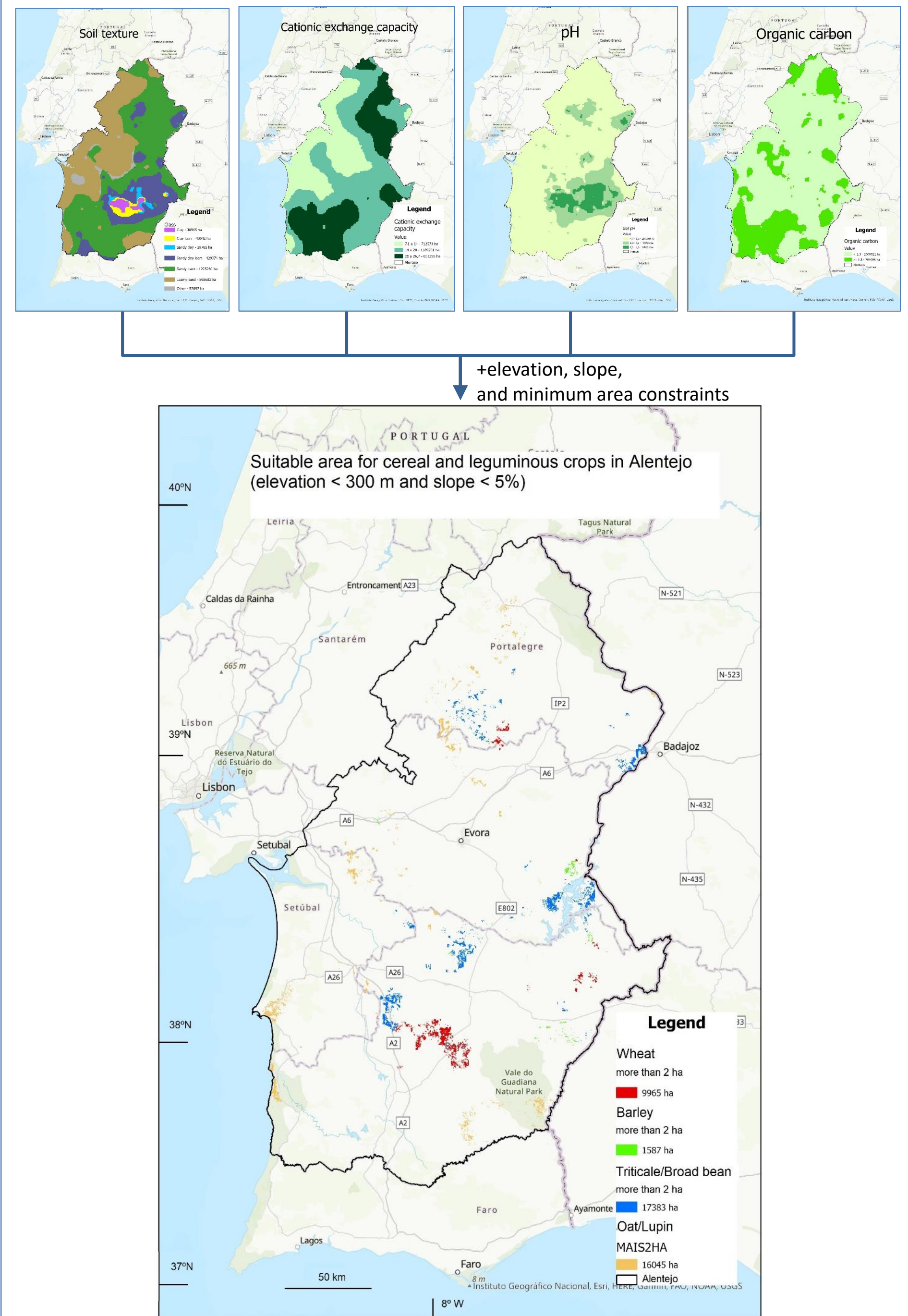
- The Infosolo Legacy Database [1], representative of data from 3461 soil profiles established between 1966 and 2014, with data of soil pH, organic carbon content, textural composition for soil taxonomy and cation exchange capacity;
- ESA's EU-DEM v1.1 Digital Elevation Model with spatial resolution of 25 m [2], for the inclusion of slope and elevation constraints;
- The Portuguese official land use / land cover map for 2018 [3], a thematic polygon map based on photointerpretation and with a hierarchical 5-level nomenclature with more than 80 classes.

Soil properties (Table 1) were assigned to typify the oat, triticale, barley, wheat, lupin and broad bean crops, aiming the suitability mapping as described. Classes of slope and elevation were thereafter applied to discriminate the potential crop areas to the prevailing physiography. Only patches larger than 2 ha were considered for analysis.

**Table 1.** Assignment of soil chemical and textural composition for four cereal and two legume crops.

	Oat	Triticale	Barley	Wheat	Lupin	Broad bean
Texture	LSa, SaL	LSa, SaCL	SaL, SaCL	SaL, SaCL	SaCL, SaL, LSa	SaCL, SaL
Cationic Exchange Capacity (CEC)	14 - 20	14 - 20	14 - 20	20 - 26.7	-	-
pH	6.3 - 7.1	6.3 - 7.1	7.1 - 8.0	7.1 - 8.0	<6.3	>6.3
Organic carbon(%)	0.1 - 1.3	1.3 - 4.4	1.3 - 4.4	1.3 - 4.4	1.3 - 4.4	-

## Results



**Figure 1.** Map of suitable areas for cereal and leguminous crops in Alentejo.

**Table 2.** Areas (in hectares) of the cereal and legume crops for slopes lower than 5% and 2.5%, and elevations lower than 300 m.

	Oat / Lupin	Triticale / Broad bean	Barley	Wheat
Slope < 5%, Elevation < 300m	16,045	17,383	1,587	9,965
Slope < 2.5%, Elevation < 300m	5,885	8,741	492	4246

## Conclusions

The assignment of soil conditions delivered overlapping areas to lupin and broad bean and oat and triticale respectively, due to similarities of soil requirements for the legume crops with these cereals. In this iterative stage, these areas can be assigned to either species in each pair. For elevations lower than 300 m and slopes lower than 5%, a prevalence was found for pairs oat/lupin (16,045 ha) and triticale/broad bean (17,383 ha) (Figure 1 and Table 2). These areal results coupled with available information on productivity, calorific power and straw yield allow the establishment of mass and energy balances [4] [5].

## References

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