

# Sustainable woody biomass production systems: a novel solution for energy, agriculture and the environment in Portugal

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## Introduction

Bioenergy is a major issue within the agriculture and energy sectors and the society in general. The environmental and social concerns raised by first generation biofuel crops increased the interest on woody biomass. Biomass production for direct conversion to heat and/or electricity is common in northern European countries, the USA, and, more recently, southern Europe, mainly based on short rotation woody crops (SRWC). These crops are renewable sources of energy, CO<sub>2</sub> neutral, able to preserve biodiversity and water, and to contribute to socio-economic development.

In Portugal, there is an increasing demand of renewable and sustainable sources of energy, particularly of low cost energy. Portugal also presents conditions to expand biomass production and use for energy, namely through SRWC. These conditions include a large growing season for the crops and an increasing availability of soils where these crops can be established. In spite of their strategic importance for the country and the environmental and socio-economic benefits to expect from these crops, there is a gap of knowledge and experience in this field in Portugal

## Goals

In 2008 we launched a research project with the purpose of developing technology for the sustainable production and use of woody biomass for energy with environmental and socio-economic benefits in terms of carbon regulation, conservation of water, soils, and biodiversity, and creation of wealth at local and regional levels. We also aimed to evaluate the potential of the Trás-os-Montes region for biomass production for energy as well as the potential for carbon sequestration by forest systems.

## Area of study

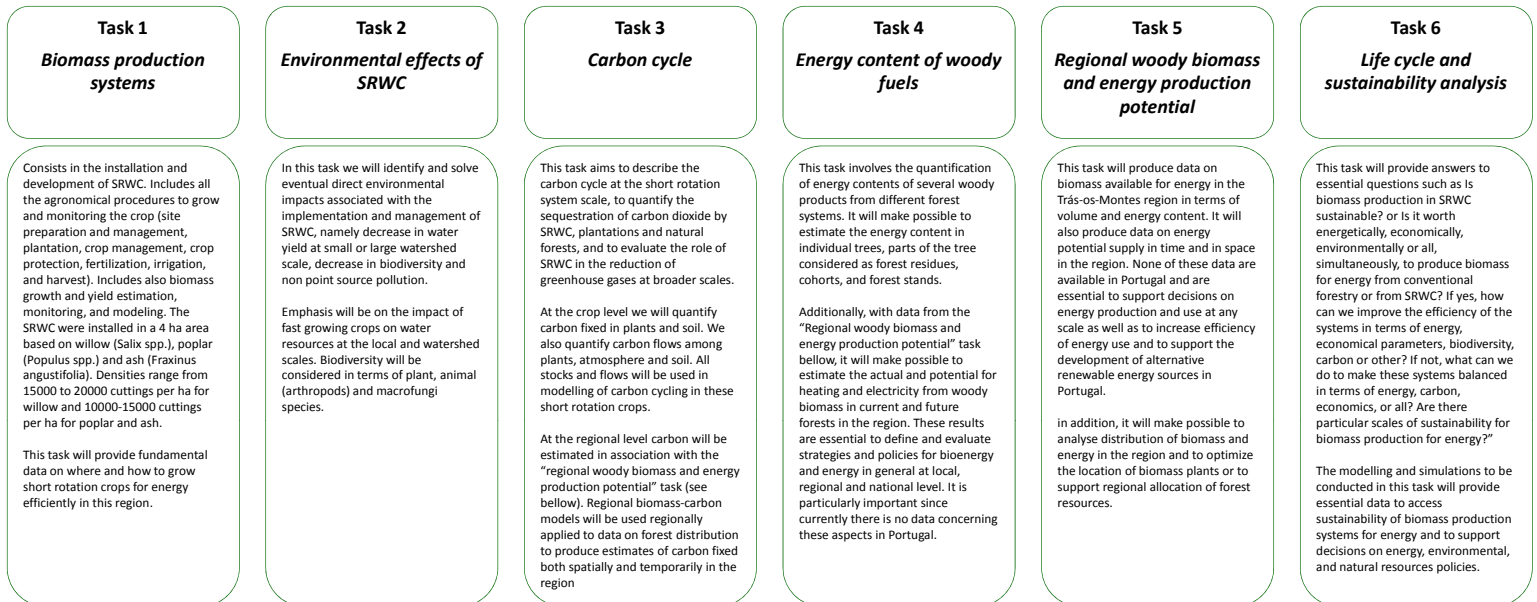
The study is centered in the Trás-os-Montes region, Portugal. The experimental plots are located in Bragança.

## Components of the project

The project comprises the six tasks described in the following diagram:

## Objectives

- To establish experimental SRWC for energy,
- To measure, monitor and model biomass production and flows of carbon, water, and nutrients in SRWC,
- To evaluate and model biomass production of other forest systems,
- To evaluate and model energy potential of woody biomass at a regional scale,
- To evaluate potential environmental effects of SRWC,
- To quantify energetically biomass from tree species in SRWC and conventional forestry systems,
- To evaluate the role of SRWC and conventional forestry systems on carbon sequestration,
- To analyse the sustainability of biomass production systems for energy,
- To establish SRWC demonstration areas.



Installation of the experimental SRWC plots in Bragança: a) The area of study before the installation of the crops; b) planting according to the double row system; c) manual planting of cuttings; d) cuttings of *Salix*; e) cuttings of *Populus*; f) fertilization with phosphorus; g) soil and arthropods samples collection; h) *Populus* cutting after plantation; i) *Populus* cutting a month after plantation; j) *Populus* plot 5 months after plantation; k) *Salix* plot 5 months after plantation