

ROBUST: Agroforestry – a sustainable agricultural system for plant and milk production in northern temperate climate

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Background: Agroforestry was practically non-existent in Denmark until 2017. From 2018-2020 three small pilot projects tried to map agroforestry effects on agricultural challenges in Denmark. It became clear that results from other countries could not be translated directly onto a Danish context and that we need research into these effects. Thus, began project ROBUST in 2020. The choice of focus on plant breeding and milk production is based on areas where there is the greatest potential for the spread of agroforestry in

Denmark.

Objectives: The aim is to research, develop and spread agroforestry in DK. The objective is to document the effect of agroforestry on important green parameters such as: carbon storage in soil and wood mass, nitrogen leaching, nature value, competition with crops, feed value of deciduous biomass and animal welfare, and to model the effects of spreading agroforestry on a larger national scale and examine the production economic effects.

Methods: Four new organic agroforestry farms have been developed and established, and the farmers will have their systems continuously monitored regarding the following parameters.

Animal welfare

The project will investigate the impact of trees on cattle animal welfare during grazing in relation to shade, shelter and skin care.

Biodiversity

The project will provide data that will form the basis for important knowledge about the biodiversity effects of forestry in northern temperate climates in regard to insects on the soil surface and in the air.

Carbon and nitrogen cycles

The purpose is to determine C storage and N uptake in agroforestry systems woody plants (above and be-

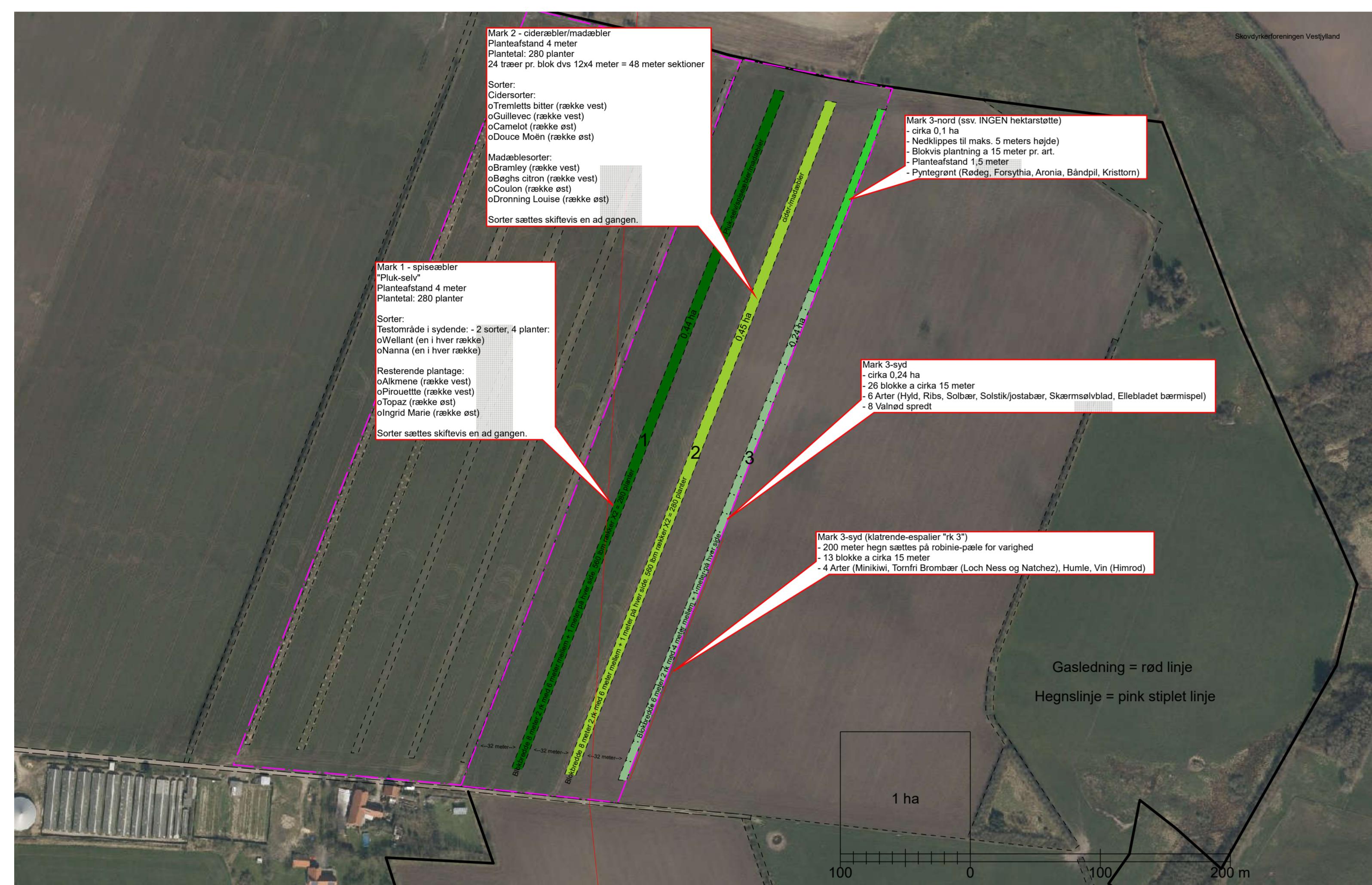
low ground biomass), including the annual C accumulation and N balance.

To quantify and document *competition* between trees and agricultural crops there will be

1. Repeated yield measurements in crops at two experimental sites at four different distances from the planting
2. Study of light and nutrient competition between trees and crops at two experimental sites
3. Business potential

To explore the *business potential* of agroforestry in company brands by:

1. Development of agroforestry product portfolio
2. Analysis of needs and value creation among customers
3. Development of marketing material for agroforestry products
4. Development of digital cultivation tools



Results: The project began medio 2020 and the first trees are planted ultimo 2021. Results will be available on an ongoing basis from 2021.

Discussion: Interest in agroforestry has increased greatly since the start of this research project. In just a few years, a large part of the farmers has learned about agroforestry - a hitherto almost unknown phenomenon in Denmark. The potential for spreading agroforestry to many of these farmers is based to some extent on the verification and quantification of effects that this project will provide.

