Long-term agroforestry research and demonstration plot at Inagro, Belgium.

Inagro is an agricultural research center located in West-Flanders, Belgium (https://inagro.be/eng). Our field of expertise spans a range of agricultural sectors such as arable farming, greenhouse and open air horticulture, cattle and intensive livestock, aquaculture and insect breeding and organic farming. Since 2014 we are conducting research on agroforestry through several national and international projects and are part of the Consortium Agroforestry Flanders. In the winter of 2022 - 2023 we are installing our own agroforestry research and demonstration plot at our research institute. This will be the start of a long-term monitoring study.

General info on location

The agroforestry research plot is situated on the site of Inagro, located in the central part of West-Flanders (click here for the exact location). The typical sandy loam soil is highly fertile and the region is therefore known for its very intensive agriculture, with highly productive open air horticulture being one of the main farming sectors in the area. This is an important challenge to the implementation of agroforestry in the region.

Research goals

The aim of the long-term monitoring study on the agroforestry research plot is twofold:

1. Assessing the long term impact of the trees and agroforestry practice on soil, water, microclimate and biodiversity.
2. Determine the economic profitability of this specific agroforestry system on the long term. With focus on how species/variety choice or management of crops and trees can be optimized to increase crop yield.

The agroforestry plot will also function as a demonstration plot towards farmers and other relevant stakeholders.

### Design of the agroforestry system

The research plot is an alley cropping system of about 1.4 hectares. Tree rows are oriented NNW-SSE. The tree component exists of walnut trees (*Juglans regia*) with an in-row distance of 8 m and inter-row distance of 24 m, resulting in a tree density of about 36 trees per hectare. The choice for walnut trees is based on the strongly increasing interest of farmers in these trees, their high economic potential and their suitability for application in agroforestry systems. The 3 meter wide strips

underneath the walnut trees will be sown in with a perennial mix of grasses and herbs, with the aim of limiting management of these strips and attracting beneficial insects. The trees will be intercropped with arable crops and vegetables typical for our region, in a 6 year rotation (potatoes, celeriac/carrot, maize, leek/cabbage, winter wheat, field beans). Perpendicular to the dominant wind direction (SW), a hedge will be planted as a windbreak and habitat for insects and birds. The plot will be managed in a conventional way.

Monitoring

Main focus is to study the **direct and indirect impact of trees on crop production and management on the long term**. Crop yield, crop quality, tree yield and management costs will be monitored carefully and will be used in the economic calculation of the agroforestry system.

Secondary we focus on the provision of **ecosystem services** by monitoring the impact on soil quality, carbon storage, water management and biodiversity. Concerning the soil we will measure chemical parameters such as nutrients, organic matter, pH,… and physical parameters such as bulk density, texture, water infiltration capacity. Soil macro- and microbiodiversity will be monitored as well. For macro-organisms focus will be on earth worms and ground beetles. All measures will be performed yearly where relevant and possible. Transects of tensiometers will be monitoring the soil moisture between tree rows during the crop growth season. Strategically placed weather stations will be permanently measuring air and soil temperature, light conditions, wind speed and rainfall relative to the distance to the tree rows.
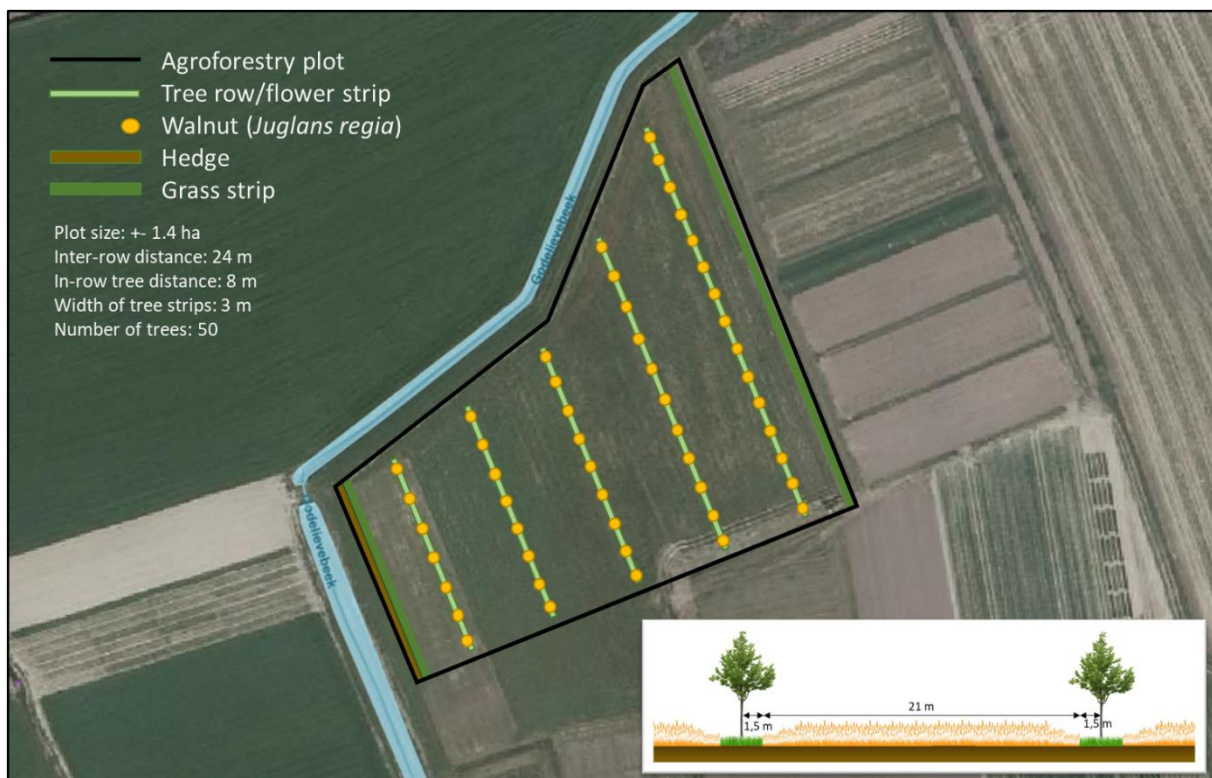
More info?

Willem Van Colen, researcher agroforestry at inagro

Willem.vancolen@inagro.be