FICHE – AGROFORESTRY CASE
"ALLEY-CROPPING FOR BIOMASS PRODUCTION AND AS A WINDBREAK IN GERMANY"

Data extracted in May 2021

Note to the reader: This set of *fiches - agroforestry case* is offering additional information to the meta analysis literature review summarised in *general fiche* and set of fiches of the environmental aspects of AGROFORESTRY. Each individual case describes an agroforestry system within the European Union, delivering more detailed information on application and management practices.

1. DESCRIPTION OF THE AGROFORESTRY SYSTEM

Geographical location	Germany
Climate zone	Continental
Geographical level	Farm
Description	In this alley cropping systems, seven fast growing tree species (willow, poplar, black locust, beech, alder, ash, and oak) are combined with arable crops. Improved microclimatic conditions benefit the arable crop at little additional cost.
Key descriptors	• Climate change adaptation • Stable microclimate to counteract wind speed/ temperature extremes • Income diversification (arable crop and wood chip) • Wood chip supply chain and biomass production • Sustainable intensification of agricultural area • Carbon sequestration
Agroforestry system	Short-rotation coppice, silvoarable: crop production and tree hedgerows
Production system	Permanent crop: willow, poplar, black locust, beech, alder, ash, and oak; Annual crop: sugar beet and cereals (winter wheat, sugar beet)
Actors involved	Farmer
Project type	Part of the AGFORWARD research project funded by the European Union's Seventh Framework Programme for research (No 613520)
Project status/ date of report	November 2017

2. LAYOUT OF THE AGROFORESTRY SYSTEM

Mechanical harvest of tree hedgerows of the alley cropping system. *Ref : Kanzler, 2015*

3. AGROFORESTRY PRACTICES AND THEIR SUSTAINABILITY TRADE-OFFS

Tree hedgerows as short-rotation coppice for biomass production	
Sustainability trade-off	1) While the tree hedgerow is growing, crop yields are expected to be impacted only slightly or not at all. Once the hedgerows have been harvested however, yields within the cropping system can increase around +24% compared to before with the hedgerows. 2) The first rotation has a low biomass output. Subsequent rotations, however, are expected to produce up to 90% more biomass. Biomass can be harvested on a 3 or 5-year rotational basis.
Key barriers	1) Both willow and poplar are vulnerable to a range of diseases, notably fungi and poplar leaf beetle. However, overall threats are much lower in Europe comparted to North America. 2) When grown in straight lines, the cultivation of fast growing trees is not expected to interfere with conventional crop production. Labour levels are expected to increase slightly. However, when practiced on a large scale, mechanical equipment can be used for planting, weed control and harvesting of the biomass feedstock. 3) The marketing of the wood chips should be researched before the establishment of the fast growing trees. For the marketing of the wood products from fast growing trees, the transport distance and water content are important factors to consider. This distance should be kept as low as possible, and the woody crop should be dried before transport.
Success factors	1) Producing a second crop of wood chips simultaneously with the arable crop, facilitates product diversification and increases the productivity per unit of land. 2) Effective site preparation and weed control are essential for the successful establishment of fast growing woody crop hedgerows. Trees should be planted in winter or spring. During the first growing year, weed control using chemicals should be carried out. During the second year, after root establishment, further mechanical weeding may be required. 3) Soil pH should range between 5.5 and 8.5, soil depth should be at least 50 cm, and for growing willow and poplar there should be a minimum precipitation rate of 600 mm.

4. SOURCES, PROJECT WEBSITE OR DATA COLLECTION ON THE CASE STUDY

Yield_and_climate_change_adaptation_using_alley_cropping.pdf (utl.pt)

Böhm C, Kanzler M, Freese D (2014). Wind speed reductions as influenced by woody hedgerows grown for biomass in short rotation alley cropping systems in Germany. Agroforest Syst 88: 579–591. DOI: 10.1007/s10457-014-9700-y.

Dimitriou I, Rutz D (2015). Sustainable Short Rotation Coppice: A Handbook, URL: www.srcplus.eu/images/Handbook_SRCplus.pdf