About the Project

A network of farms and stakeholders were formed, to collect agronomic and socio-economic data to assess environmental, social and economic sustainability of the integrated food and non-food systems. CFE system was identified in Denmark.

Objectives

 To assess the agronomic productivity and environmental performance of the Danish CFE

system

 To design innovative CFE with state-of-the-art tools and models







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FACCEJPI

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Factsheet

Combined food and energy system (CFE), Taastrup Denmark.

Combined food and energy system

The Danish CFE system is a Combined Food and Energy system, integrating food (spring barley, winter wheat and oat) and fodder crops (lucerne and ryegrass) with mixed stands of short rotation coppice (SRC): willow, alder and hazelnut.

Woodchips for energy production

The biomass belts are harvested and chipped every 4 years and the wood chips taken to a nearby heat and power station for the production of heat and electricity.





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Short rotation coppice

The CFE system consists of 10.1 ha of food components like spring barley, winter wheat, oat and lucerne/ryegrass as fodder components and 0.75 ha of biofuels (biomass belts) consisting of five belts of SRC. Each biomass belt is 10.7 m wide and consists of 5 double rows of SRC; within the five double rows, three in the middle consist of three willow clones (one double row each) of *Salix viminalis* (L.) "Jor", *Salix dasycladus Wimmer* and *Salix triandra cinerea* (L.) bordered by one double row of common hazel *Corylus avellana* (L.) on one side and one double row of alder (*Alnus glutinosa* (L.) *Gaertner*) on the other side

The trees are planted at within-row spacing of 0.5 m and between-row distance of 0.7 m. Each double row is 1.3 m apart, with a planting density of 18,600 trees/ha. Along the long edges of the SRC belts, 4 meter-wide "turning headlands" were created by fallowing a grass-ley, this area was only for machinery turning without any crop production. The biomass belts are established at varying distances of 50, 100, 150 and 200 m to assess the spatial effects of distance.

Tree Density	Stand biomass Yield	Dry biomass Yield
18,692trees/ha	50.8t/ha	25.6yield



Cost & benefits for CFE system

Table 1. Total Cost, revenues and cumulative net margin of different CFE scenarios after a fouryear rotation

CFE Scenarios	Total	Total cost	Cumulative
	(€/ha)	(€/ha)	(€/ha)
50m(SRC -winter	3637.1	1952.3	1684.8
100m(SR C-winter	4249	2163.9	2085.1
wheat) 150m(SR C-winter	4502.1	2238.6	2263.5
wheat) 200m(SR	1672 6	2286.8	2286.8
wheat) Winter	4473.9	2230.8	2058.3
wheat SRC	1324.9	1534.7	-209.8

Results: 200m SRC-winter wheat CFE scenario gave the highest return of 2386.8 €/ha followed by 150 m (SRC-winter wheat)







