

Objectives

Quantification of production related characteristics and aboveground biomass production of different *Populus* clones in an operational short-rotation-coppice culture for energy production:

- i. Clonal and species variation in structural (leaf area development, crown structure) and physiological (photosynthesis, conversion-efficiency) growth characteristics and woody biomass yield;
- ii. Spatial variability of growth in relation to flux measurements of greenhouse gases;
- iii. Integration of production related parameters in a process-based model for prediction of growth and productivity.

Materials and methods

Experimental short-rotation-coppice (SRC) plantation in Lochristi (Ghent, BE) with fast-growing poplar and willow trees

Plant material

- 12 poplar and 3 willow clones (Table 1)
- Different species and interspecific hybrids
- Dormant 25 cm long cuttings

De Vos Salix (Eksaarde, Belgium)*		Vermeerderingstuinen Nederland (Zeewolde)		INBO (Geraardsbergen, Belgium)	
Code	Species (F×M)	Code	Species (F×M)	Code	Species (F×M)
Gudrun	<i>Salix dasyclados</i>	Ellert	D × N	Bakan	T × M
Tora	<i>Salix schwerinii</i> × <i>Salix viminalis</i>	Hees	D × N	Skado	T × M
		Koster	D × N	Muur	D × N
		Robusta	D × N	Oudenberg	D × N
		Brandaris	N	Vesten	D × N
		Wolterson	N	Grimminge	D × (T × D)
		Belders	<i>Salix alba</i>		

D = *Populus deltoides*, M = *Populus maximowiczii*, N = *Populus nigra*, T = *Populus trichocarpa*
* Distributor of Lantmännen Agroenergi (Örebro, Sweden)

Establishment

- On 18.4 ha of previous cropland and pasture (Fig. 2)
- Land preparation by ploughing, tilling and pre-emergent herbicide treatment
- Planting with agricultural leek planting machine
- Double-row system with alternating distances of 0.75 m and 1.50 m between the rows and 1.1 m in the row
- Planting density of 8000 cuttings ha⁻¹
- Replicated monoclonal blocks (Fig. 1)

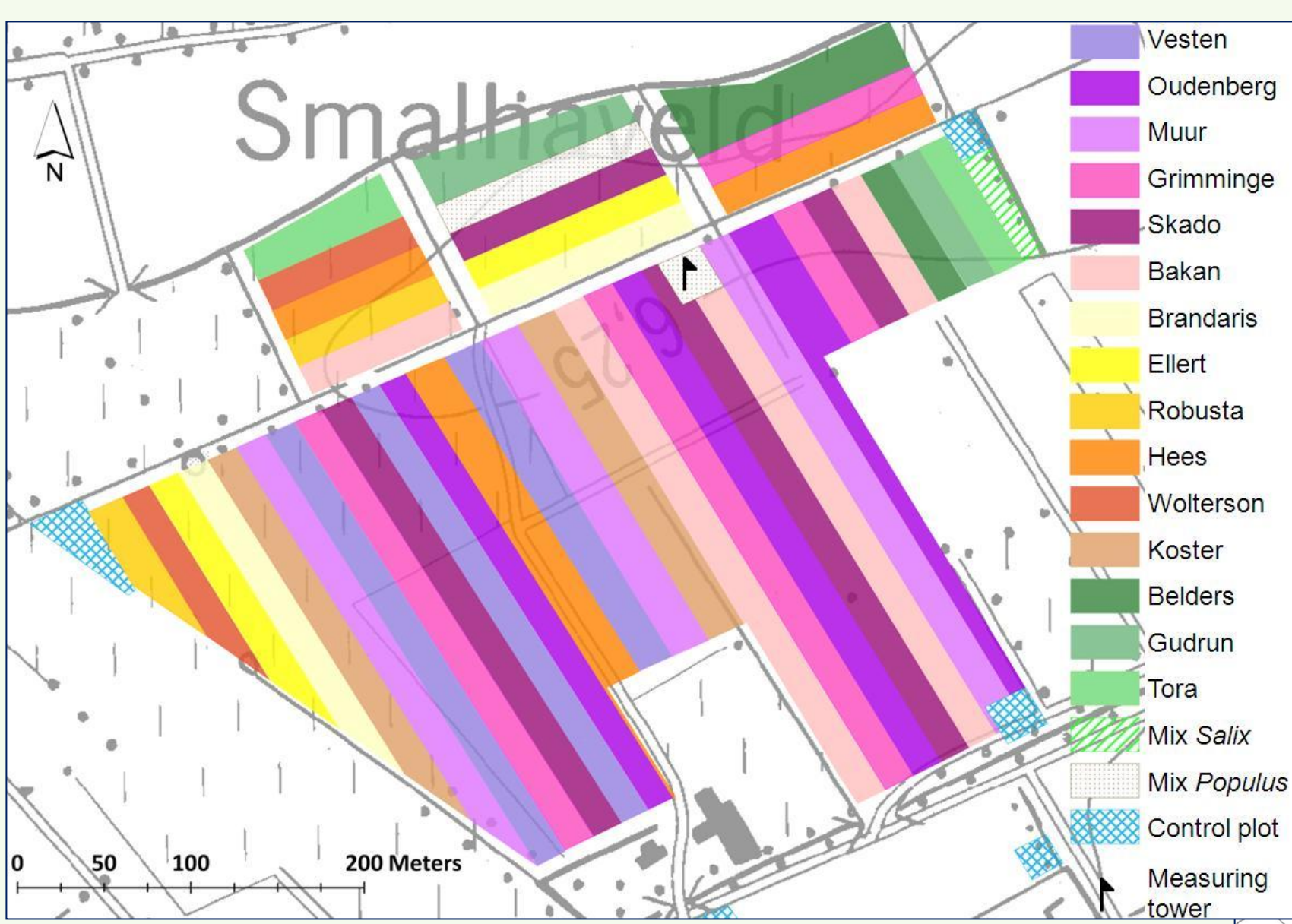


Table 1: Poplar and willow clones planted in the SRC plantation in Lochristi.

Fig. 2: Previous land use of the SRC plantation in Lochristi.

Fig. 1: Planting scheme of the SRC plantation in Lochristi with replicated monoclonal blocks.

First results and discussion

Initial growth measurements during establishment year 2010

	DATE	RESULT	DISCUSSION
Mortality (Fig. 5)	17-18 May 2010	Average mortality = 9 % (± 9.3)	6 weeks after planting survival rate is high as expected
	25-27 August 2010	Average mortality = 19 % (± 6.9)	High mortality mainly due to chemical and mechanical weed management
Leaf Area Index* (LAI) (Fig. 4)	29-30 July 2010	Average LAI = 0.4 (± 0.22)	No canopy closure
	1-2 September 2010	Average LAI = 1.1 (± 0.47)	Canopy closure was nearly reached 5 months after planting

* with LAI-2000, LI-COR, Lincoln, NE, USA

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Fig. 3: Spatial variability of leaf area index (September 2010) and mortality (August 2010) in the SRC plantation in Lochristi.

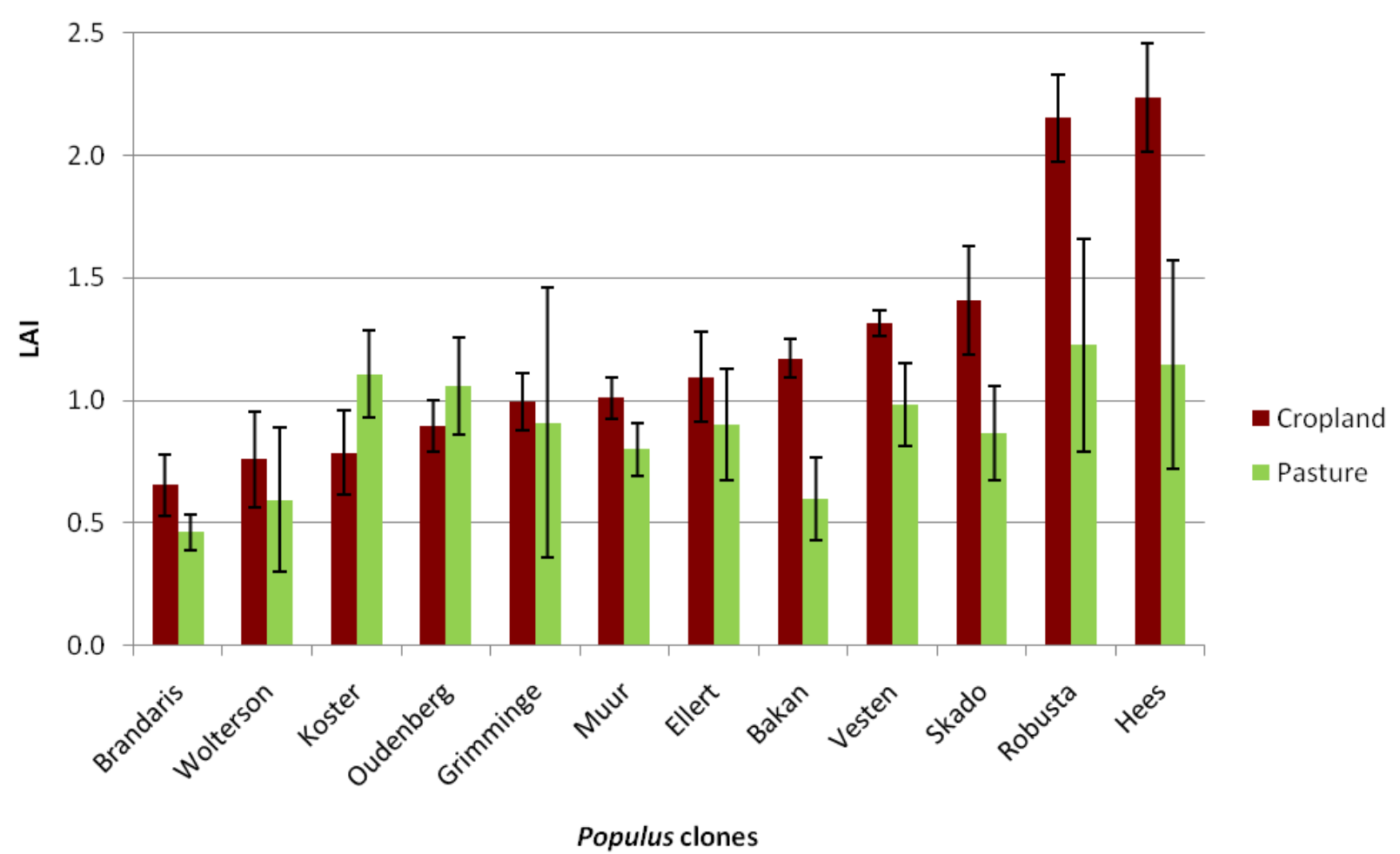


Fig. 4: Average leaf area index with LAI-2000 on 1-2 September 2010. Error bars indicate standard deviation.

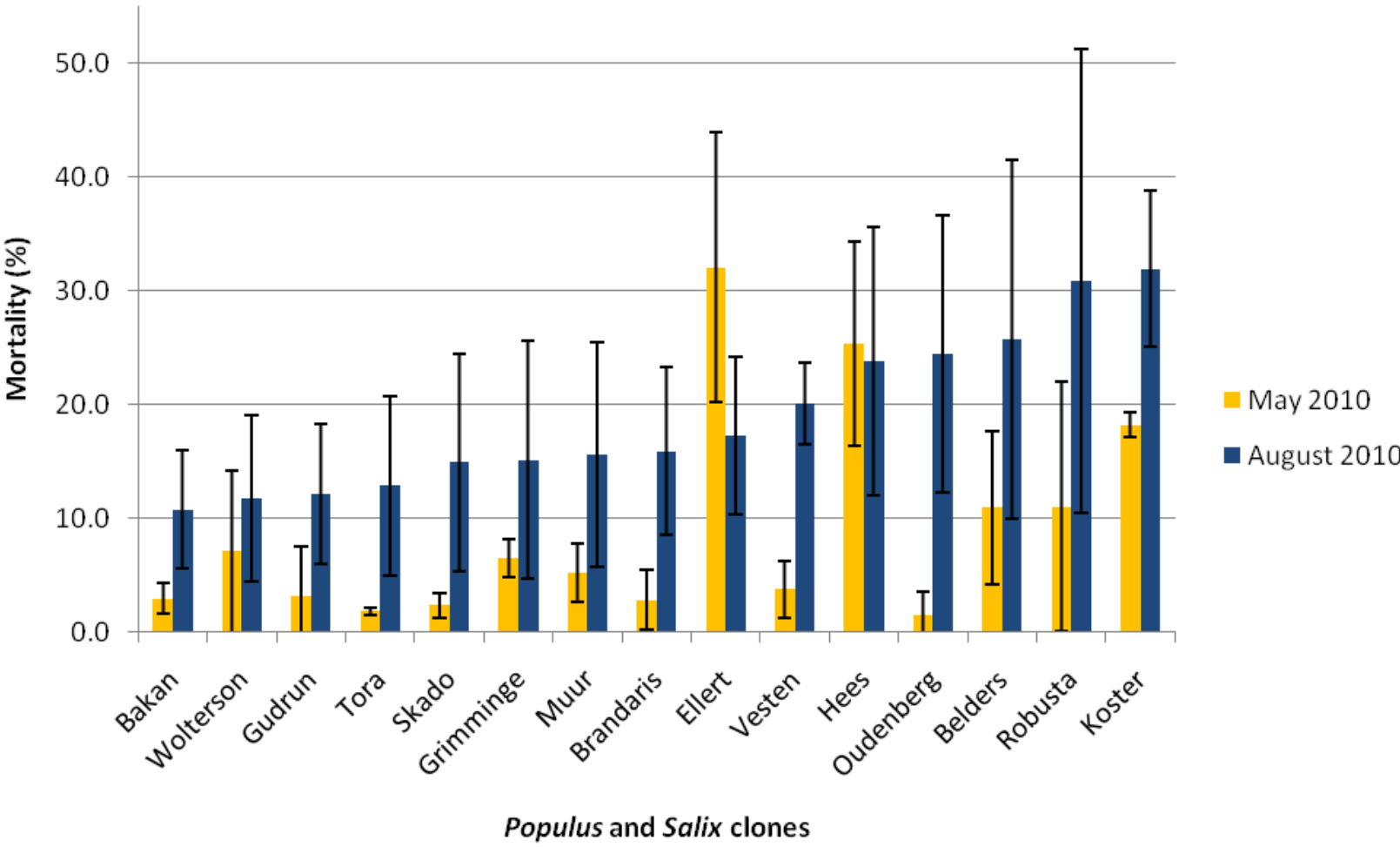


Fig. 5: Average mortality after planting (May 2010) and after weed management (August 2010). Error bars indicate standard deviation.