Reed as a Renewable Resource
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Floodplain meadows as alternative source of biomass for bioenergy production

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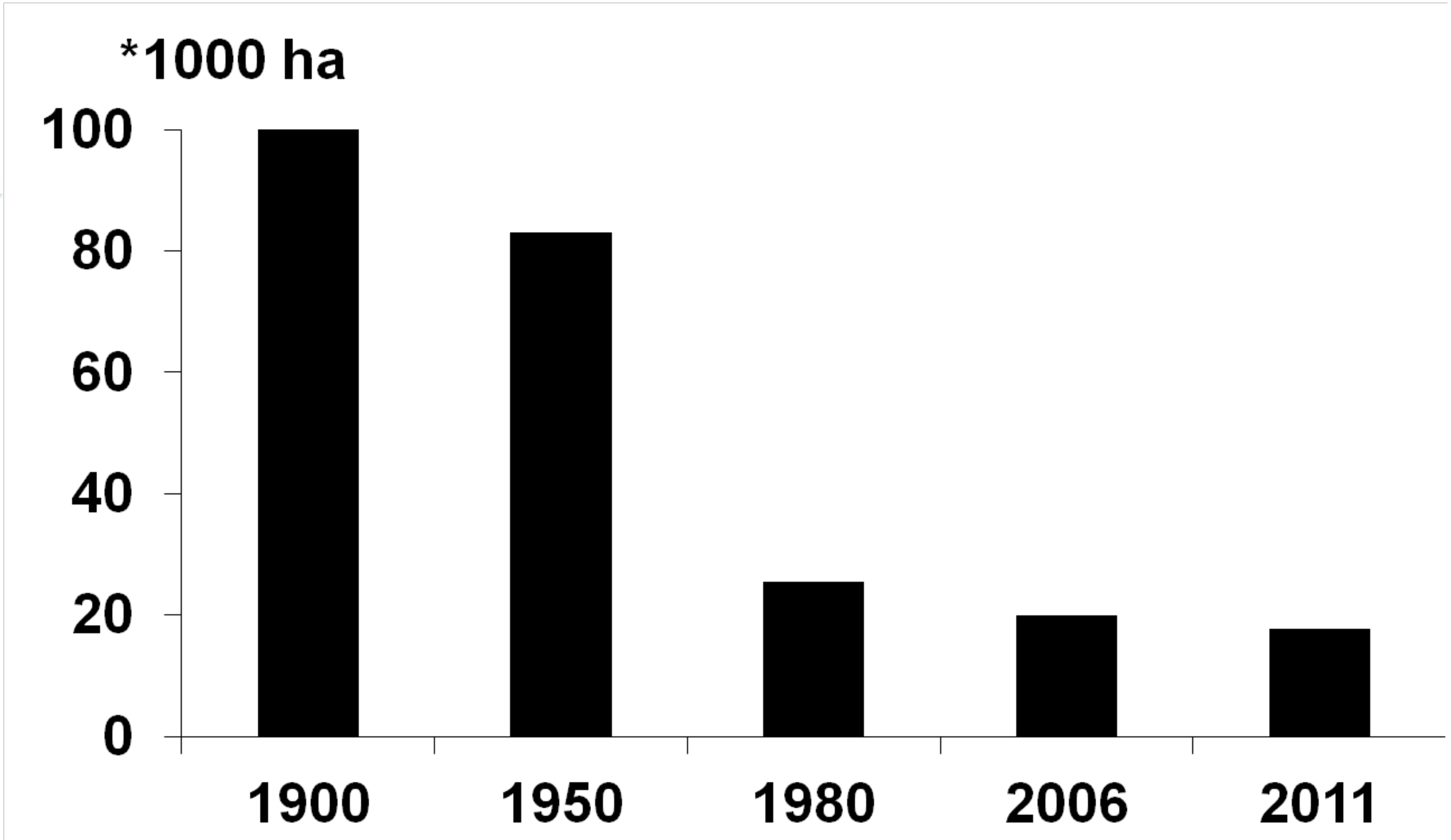
Floodplain meadows

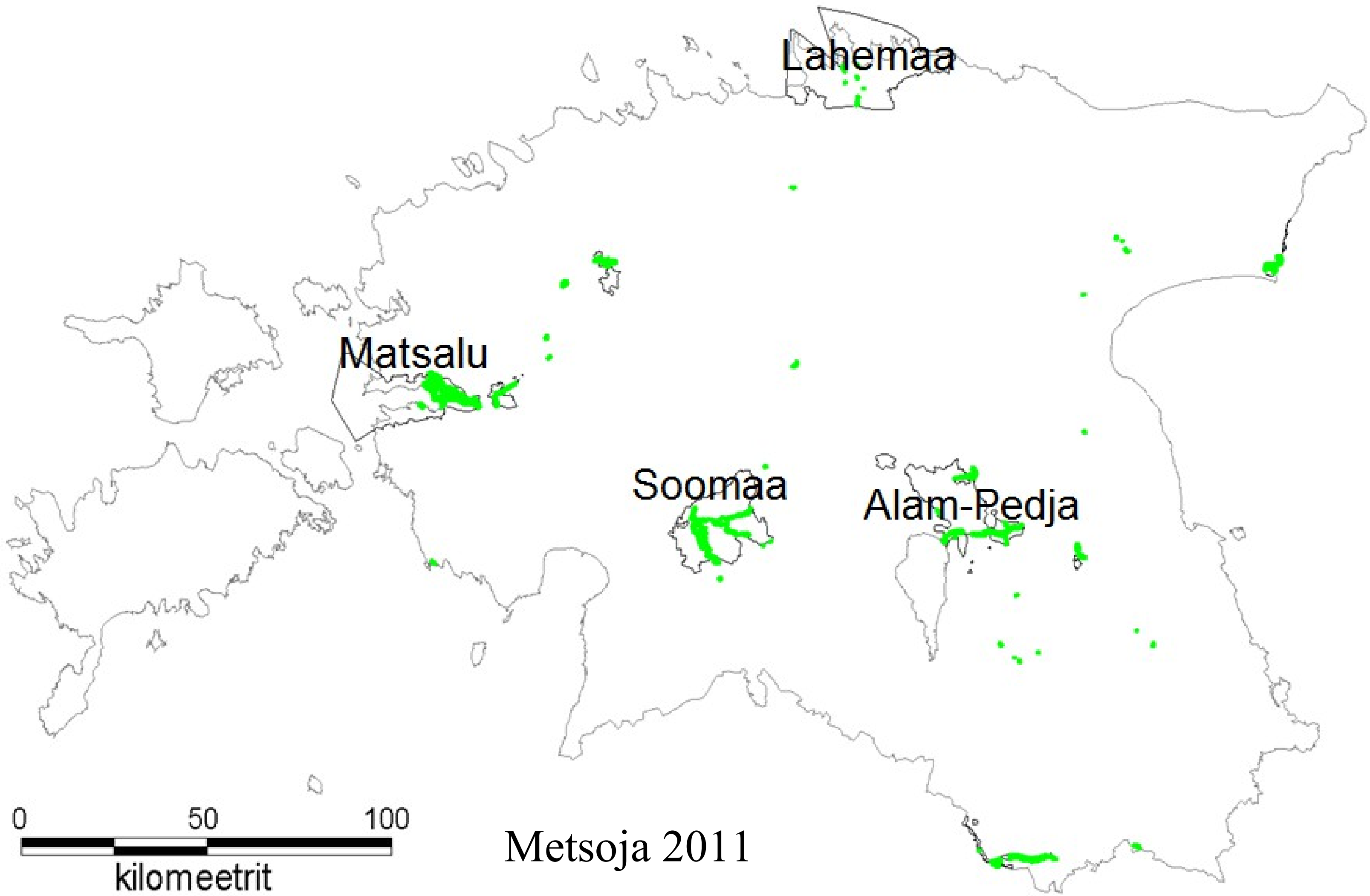
- Seasonally flooded plant communities on the river banks
- Wetland type (Ramsar)
- Semi-natural grassland type (Natura 2000)

Floodplain meadows



Sammul et al. 2000; Kukk and Sammul 2006; EEIC 2012

Floodplain meadows



Metsoja 2011

Unused renewable resource




Aim

- Find alternative usage for biomass from floodplain meadows
- Objectives:
  - biomass yield and dynamics;
  - different functional groups;
  - chemical composition;
  - energy potential for different conversion options

Material and methods

No	Area	Soil	2007	2008	2010
1	Alam-Pedja	Alluvial fen soil	X	X	X
2	Soomaa	Alluvial gleysoil	X	X	X
3	Alam-Pedja	Alluvial gleysoil	X	X	X
4	Soomaa	Alluvial fen soil	X	X	
5	Alam-Pedja	Alluvial fen soil	X	X	
6	Alam-Pedja	Alluvial fen soil	X		
7	Matsalu	Alluvial fen soil	X		
8	Soomaa	Alluvial fen soil	X		
9	Matsalu	Alluvial gleysoil	X		

Material and methods

No	Type	Species
1	Wet floodplain meadow	*Carex sp., Filipendula ulmaria, Deschampsia cespitosa, Alopecurus pratensis*
2	Wet floodplain meadow	*Filipendula ulmaria, Calamagrostis stricta, Carex sp., Deschampsia cespitosa*
3	Wet floodplain meadow	*Carex sp., Phalaris arundinacea, Calamgrostis canescens, Glyceria maxima, Agrostis gigantea*
4	Wet tall sedges floodplain meadow	*Carex sp., Filipendula ulmaria, Calamagrostis stricta, Phalaris arundinacea*
5	Wet tall grasses floodplain meadow	*Phalaris arundinacea, Carex sp., Glyceria maxima, Equisetum fluviatile*

Material and methods

- Samples from 9-17 round plots (0,07 m^2 and 0,18 m^2) of transect(s) (180-300 m)
- Harvested on the ground level in July or June-July-August
- Samples were dried for 48 h at 80 °C to determine dry weight

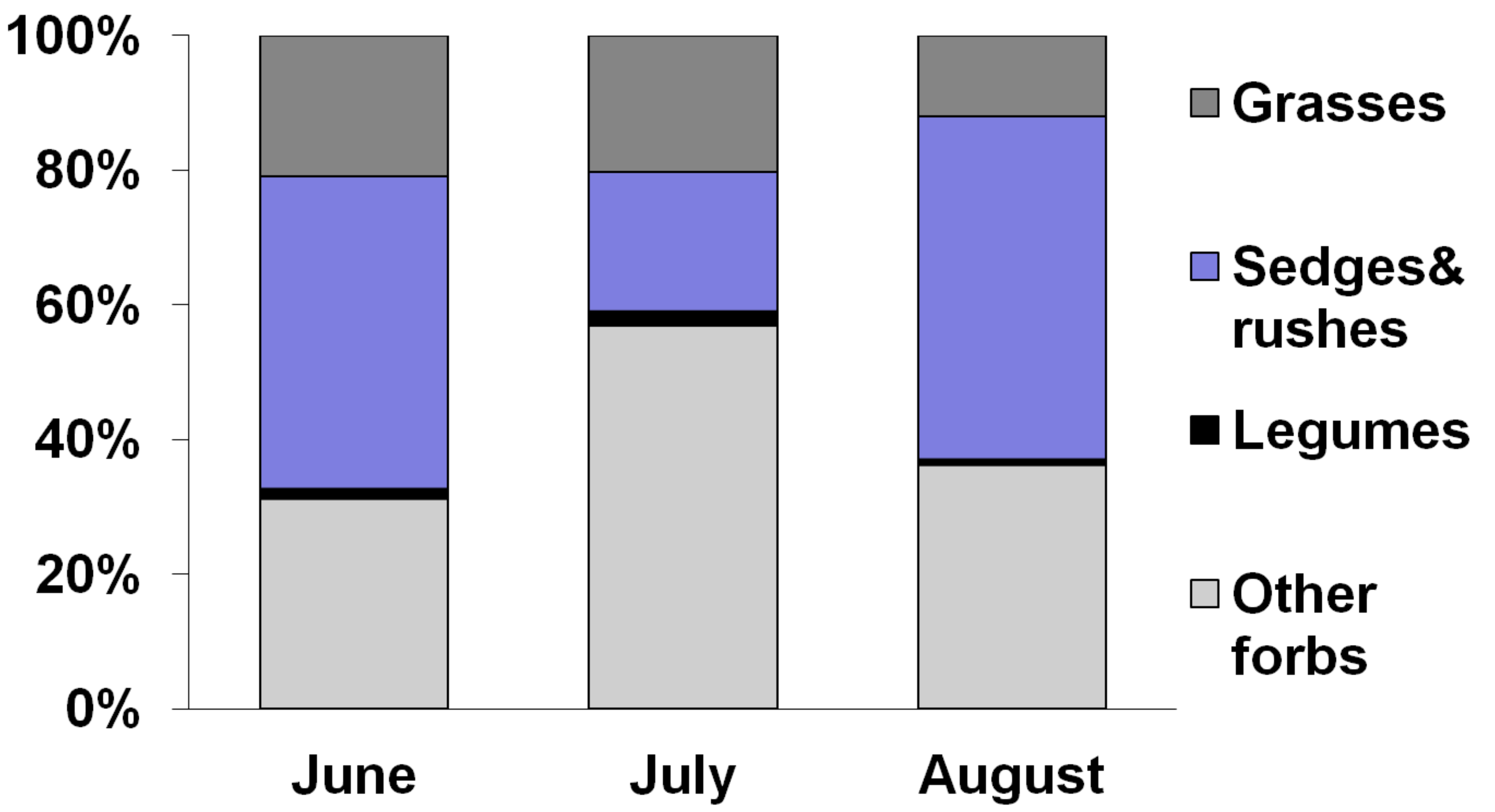
Material and methods

- Samples were sorted into groups
- Grasses (*Poaceae*), sedges-rushes (*Cyperaceae&Juncaceae*), legumes (*Fabaceae*) and other broadleaved forbs
- The proportion of each group was calculated by its dry weight

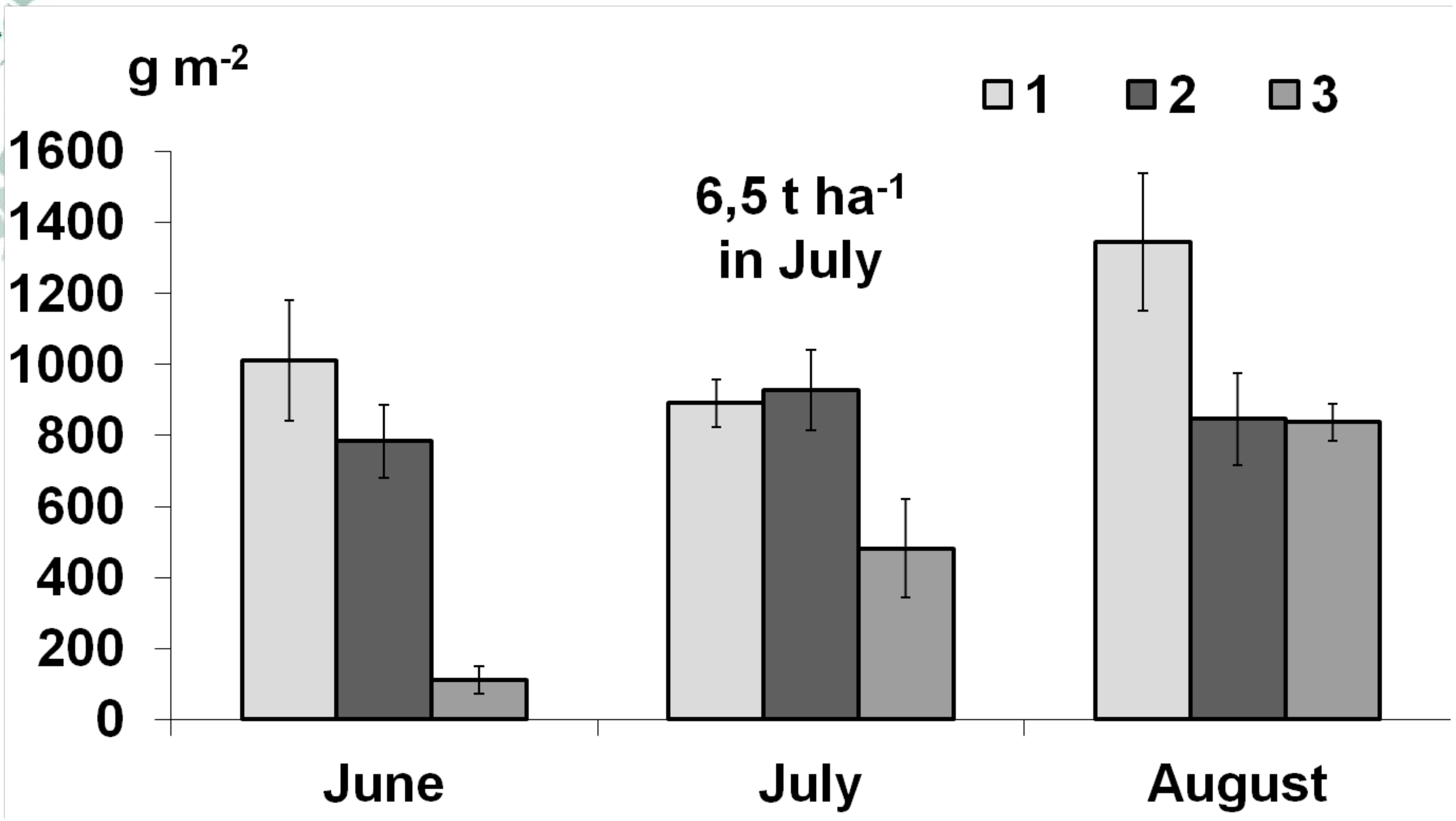
Material and methods

- NDF and lignin (%DM)
- C, N, S, Cl, Ca, Mg, K and ash (%DM)
- Calorific value (kJ g^{-1})
- BMP experiment (litre CH_4 kg^{-1} VS)

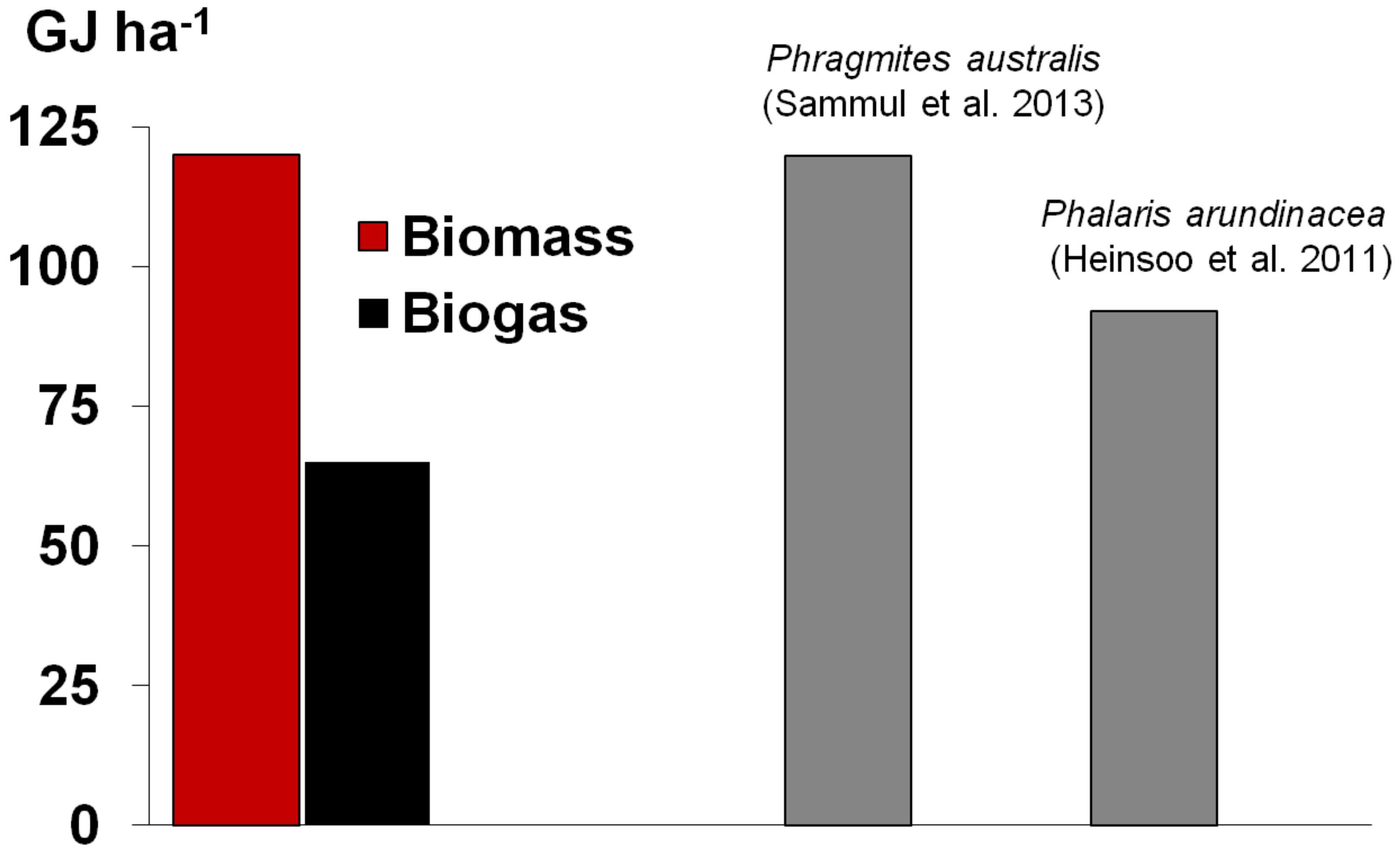
Biomass monthly dynamics



Biomass monthly dynamics



Energy yield (GJ ha^{-1})



Conclusions

- Biomass yield and dynamics depend on studied site
- The quality of biomass depends on the functional group

Conclusions

- Sedges and rushes - high calorific value and low ash content
- Grasses & other broadleaved forbs - high ash content and low calorific value
- Legumes – first 14 days higher CH_4 yield
- Sedges and rushes – high CH_4 yield and high NDF-low lignin content

Conclusions

- Energy yield in the same range with that from dedicated energy crops
- Bioenergy production can be energetically feasible
- Combustion is suggested

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Estonian Ministry of Education and Research

ARCHIMEDES

Thank you!

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