



Biomass quality of paludiculture plants (Cattail and Common Reed) for various utilisation options

RRR2021 conference – Nora Köhn



Paludi-PRIMA project

PALUDI CULTURE



Paludi-PRIMA

Putting paludiculture into practice:
Integration – Management - Cultivation



BIOMASS QUALITY

Cattail

(*Typha latifolia*
Typha angustifolia)



© Gartenratgeber.net



© Plantopia.de

Common reed

(*Phragmites australis*)

Experimental field



© T. Dahms



© K. Haldan

Mesocosms

(2019-2020)

Utilisation options (biomass requirements)



© T. Dahms



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Measurement and analysis

(project biomass)

Utilisation options - Cattail

Building materials

- Insulating panels
- Cavity-wall insulation



© Fraunhofer IBP



© A. van Weeren



© typha technik



© T. Dahms



Fodder



© Geurts et al. 2018



© A. van Weeren

Utilisation options - Common reed

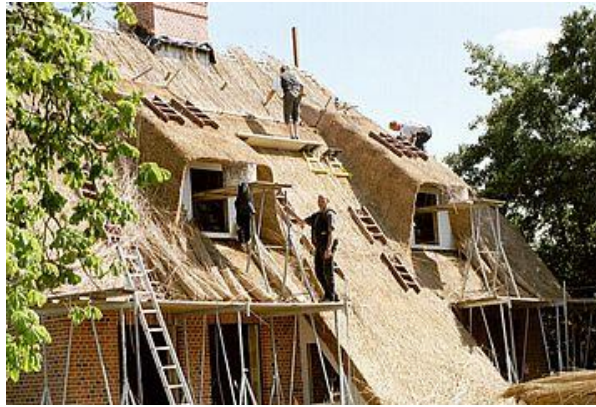
- Building materials**
- Thatching reed
 - Insulation panels e.g.
 - Fire protection panels etc.



© Hiss Reet



© C. Schröder



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Other possible utilisation options

Bio-based plastics



© BIOWERT

Substrate



© gartenfreund.de

Foam material



© Fraunhofer WKI

Solid fuel



© VIP-Endbericht, 2013

Packaging



© Landpack



© NewFoss

Moulded pulp, disposable tableware



© Bio-lutions

Biogas



© UBA

Quality requirements

- Morphological parameters
 - Length and diameter of culms
 - Amount of fruiting stalks
 - Parts/ whole plant
- Chemical parameters
 - Ingredient composition (element content)
 - Harmful substances (e. g. herbicides)
- Harvest date
 - Winter (dry biomass)
 - Summer (fresh biomass)
- Influencing factors
 - A. o. water level, nutrient availability



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© T. Dahms

Common reed for thatching

Testing methods are based on 2 factors (Greef & Horlings, 2016):

1. protection against intruding water and drying ability
2. starting point and speed of decomposition processes

Only if you can prevent the roofing from getting humid inside, you can inhibit the decomposition.



© A. van Weeren

old but intact



© DBU, 2008

permanent humid



© Greef & Horlings, 2016

less degraded



strongly degraded

Common reed for thatching

Parameters (DBU, 2008; Greef & Horlings, 2016; ZVDH, 2018):

culm length	140-200 cm
culm diameter	3-9 mm
water content	<18 %
lignin + silicon content	high
biological degradability	slow
water absorption	low
maturity stage	panicles + no leaves
bending strength	flexible
breaking strength	high

-> processing (cutting height, cleaning, drying, storage)



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© R. Borris, Nord Reet UG, 2008



© R. Borris, Nord Reet UG, 2008



© DBU, 2008



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Are the results transferable?

Mesocosms



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Average culm length = 69.9 ± 22.8 cm
Average culm diameter = 1.89 ± 0.55 mm



Thatching reed stand



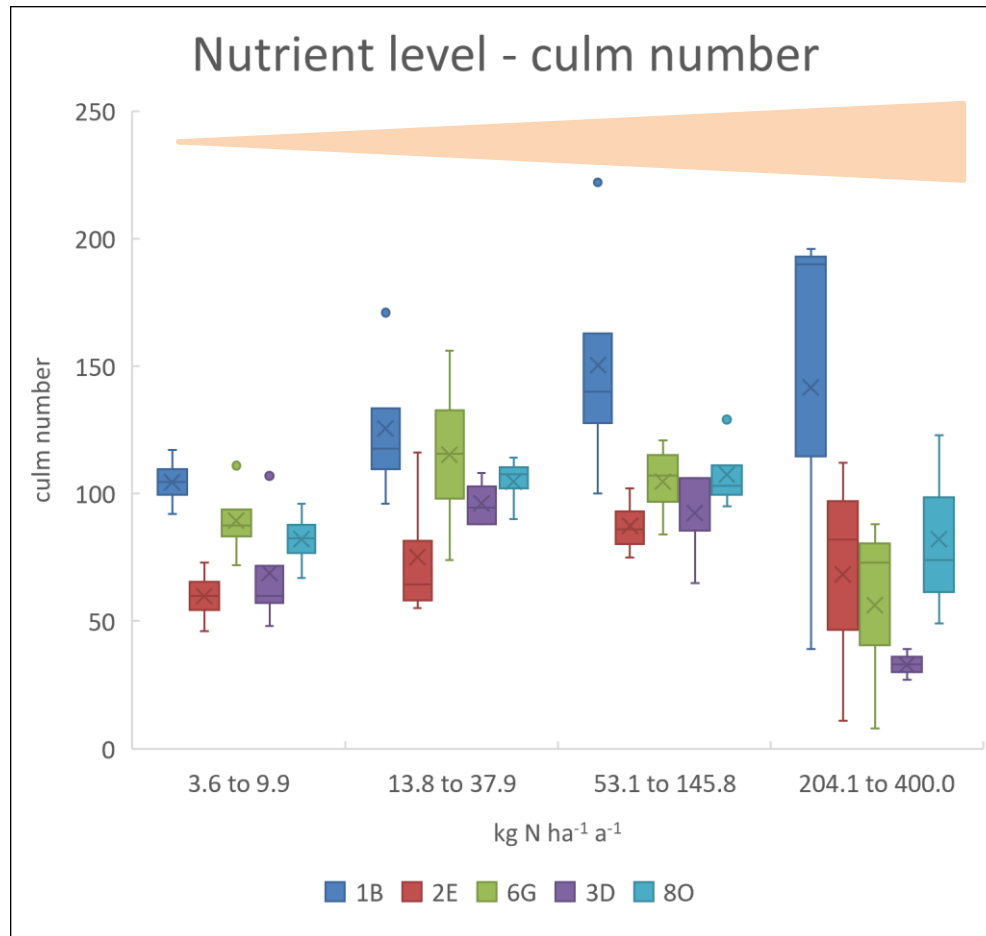
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Average culm length = 171.7 ± 32.4 cm
Average culm diameter = 4.8 ± 1.0 mm

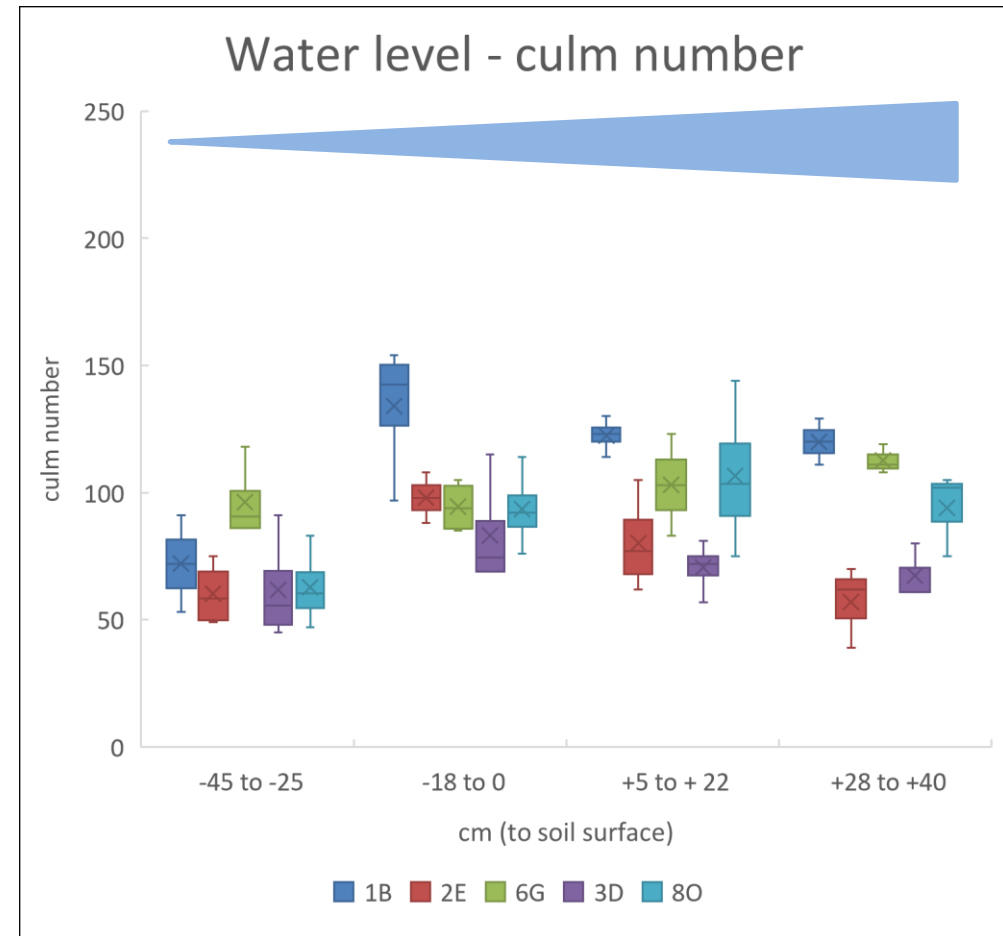


Comparison between clones + influence of water and nutrients

Mesocosms – selected results



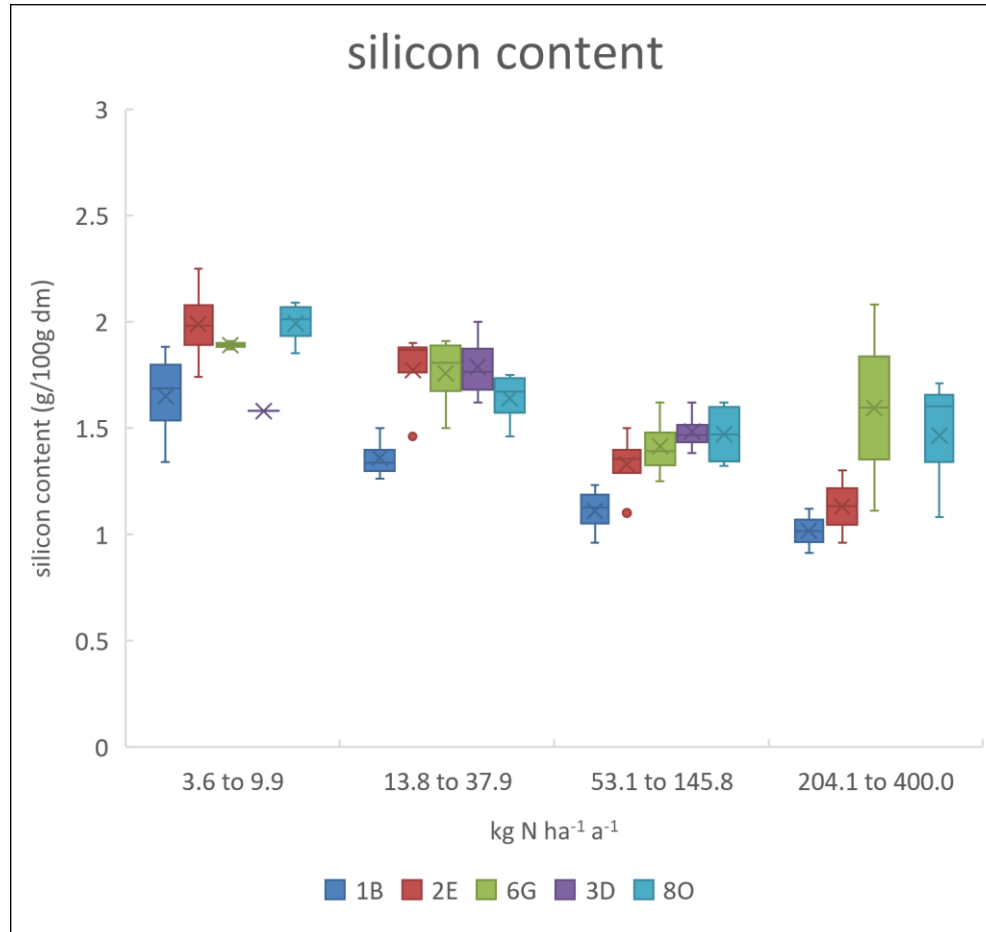
15 level = 3.6 – 400 kg N ha⁻¹ a⁻¹ (4 groups)



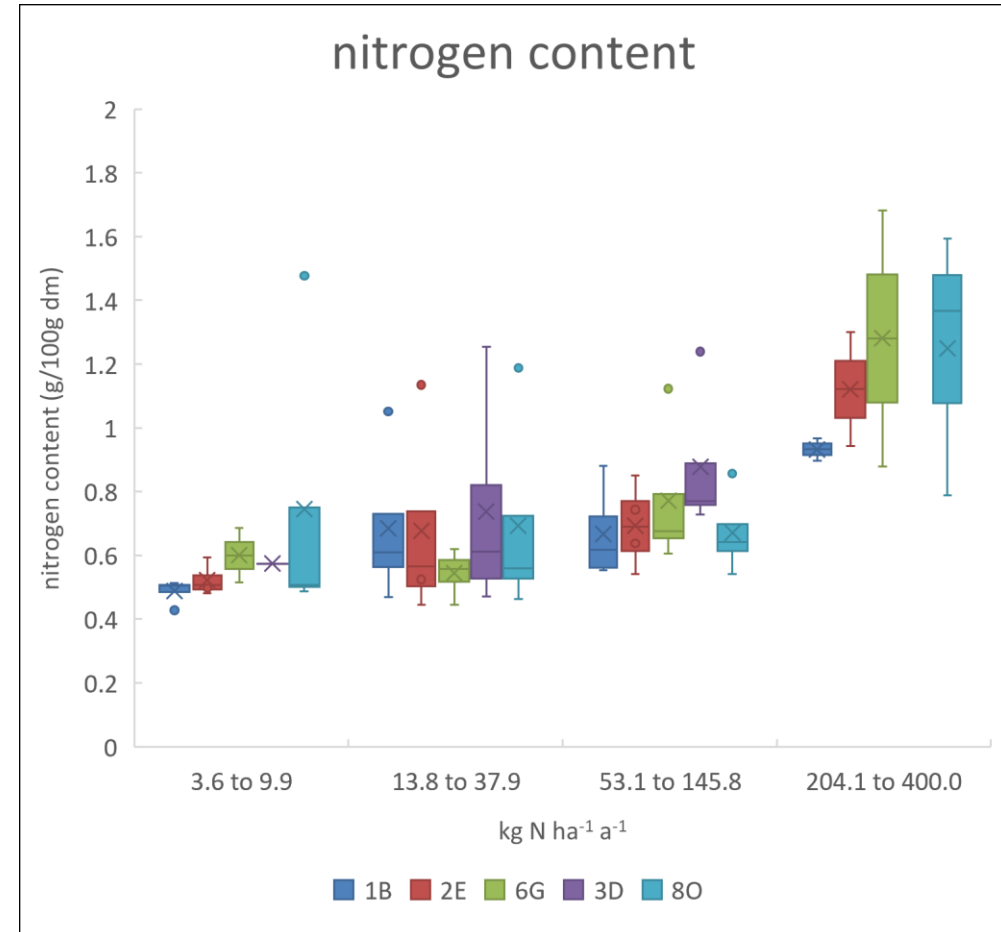
15 level = -45 – +40 cm to soil surface (4 groups)

5 *Phragmites australis* clones from thatching reed stands (Northeast Germany)

Mesocosms – selected results nutrient level

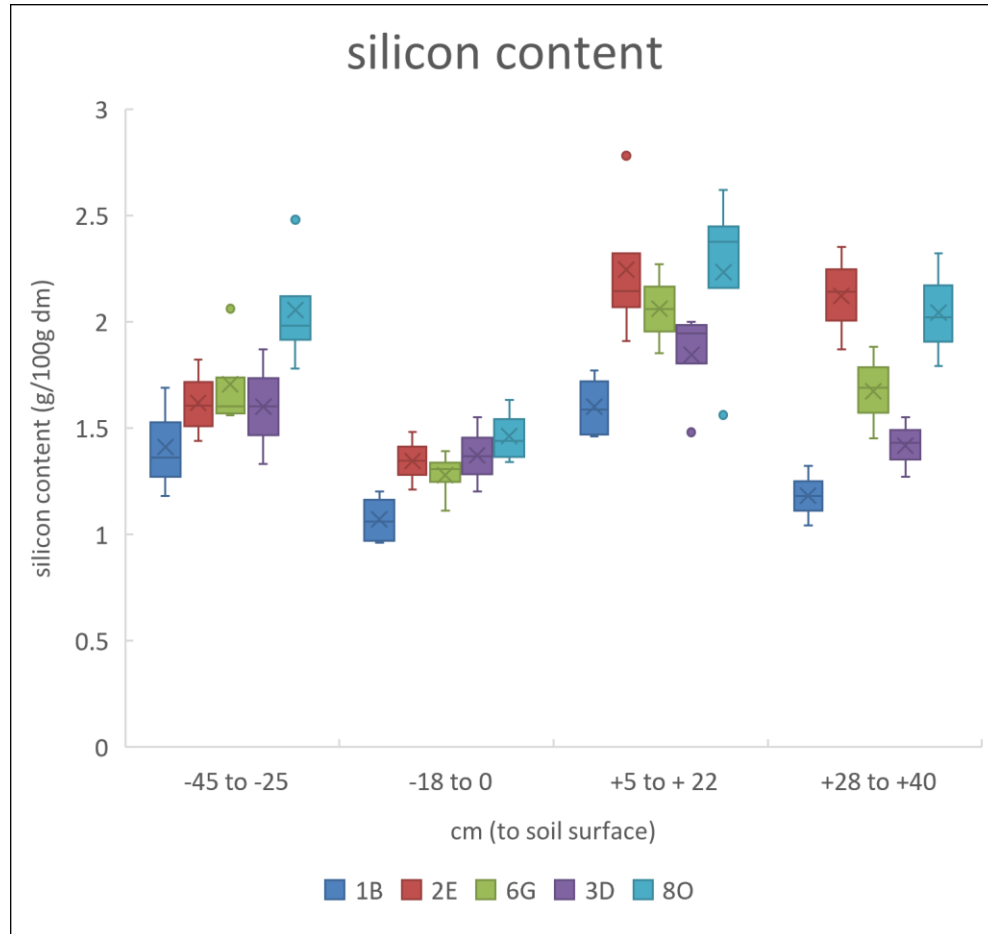


-> supporting function, hardness

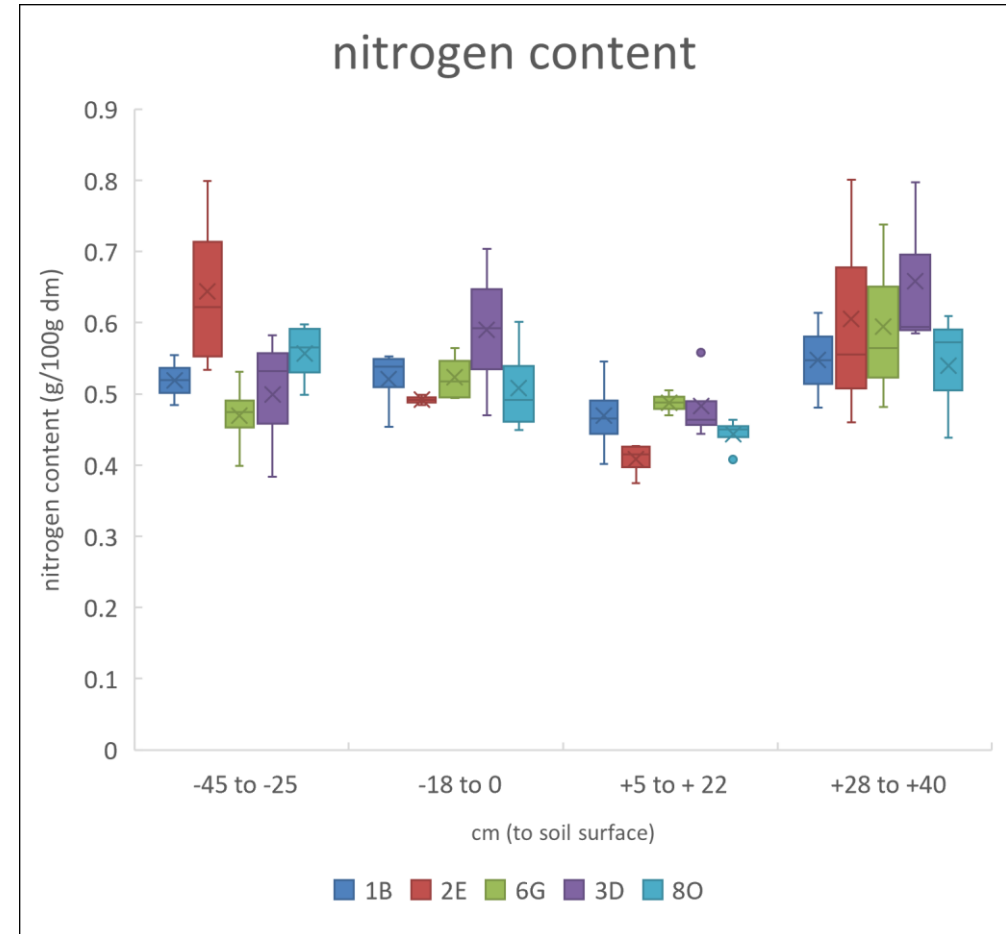


-> decomposition processes

Mesocosms – selected results water level



-> supporting function, hardness



-> decomposition processes

Outlook - Experimental field + practitioner survey

- Further investigations at the experimental field -> increased transferability
- Practitioner survey -> definition of biomass requirements for utilisation options

Digital excursion

“Field-scale *Typha* paludiculture in NE Germany – Set up and 1st year’s experiences”



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Information from other Paludi-PRIMA work packages



MANAGEMENT

Session 6.2

Kerstin Haldan: „Plant selection for paludiculture: water and nutrient level optima differ among Typha species“



ECONOMICS OF PALUDICULTURE

Session 1.1

Sabine Wichmann: „Common reed for thatching in Northern Germany“

Poster 6.3A

Telse Vogel: „Efficiency of cattail establishment on an eight-hectare fen site in terms of working time and manpower requirements“



GENOTYPING OF COMMON REED

Session 4.2a

Kristina Kuprina: „Population genetic structure of common reed (Phragmites australis)“

Anna Rudyk: „How can the population genetic diversity of common reed, Phragmites australis, change over 24 years?“

Thank you for your attention!



Literature

- DBU (Deutsche Bundesstiftung Umwelt) 2008. Reet als Dacheindeckungsmaterial – Qualitätssicherung und -erhaltung eines Baustoffs aus nachwachsenden Rohstoffen. Abschlussbericht 25018/01, ed. QSR – Gesellschaft zur Qualitätssicherung Reet mbH, Kiel.
- Greef, J. M. & Horlings, H. 2016. Die Qualität von Reet. Entwicklung einer Methode zur Beschreibung der Qualität von Reet. Riet ABC BV, Nijkerk.
- ZVDH (Zentralverband des Deutschen Dachdeckerhandwerks e.V.) 2019. Produktdatenblatt für Reet – Maße, Anforderungen, Prüfungen. In: Deutsches Dachdeckerhandwerk – Regeln für Dachdeckungen, ed. Rudolf Müller Verlag, Köln.