UNIVERSITÄT GREIFSWALD
Wissen lockt. Seit 1456

GREIFSWALD MIRE CENTRE

PALUDI CULTURE PRIMA

Mecklenburg Vorpommern
Landesforschungsanstalt für Landwirtschaft und Fischerei

Workshop for business enterprises
11th March 2020

Putting paludiculture into practice

Integration - Management - Cultivation (Paludi-PRIMA)

Gefördert durch:
Bundesministerium für Ernährung und Landwirtschaft
aufgrund eines Beschlusses des Deutschen Bundestages

FNR
Fachagentur Nachwachsende Rohstoffe e.V.

FKZ:22032718

Telse Vogel,

Josephine Neubert & Sabine Wichmann

What is paludiculture?

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Productive use of wet and rewetted peatlands

- „***palus***“: mire and „***cultura***“: cultivation

Aims of paludiculture

- Peat conservation : - stop subsidence and soil degradation
  - reduce GHG emissions
- Production : - conservation of productive area (agriculture, forestry)
  - strengthening regional added value
- Optional: - peat formation
  - water protection
  - cooling of the local climate

Why has the rewetting of peatlands gained political importance?

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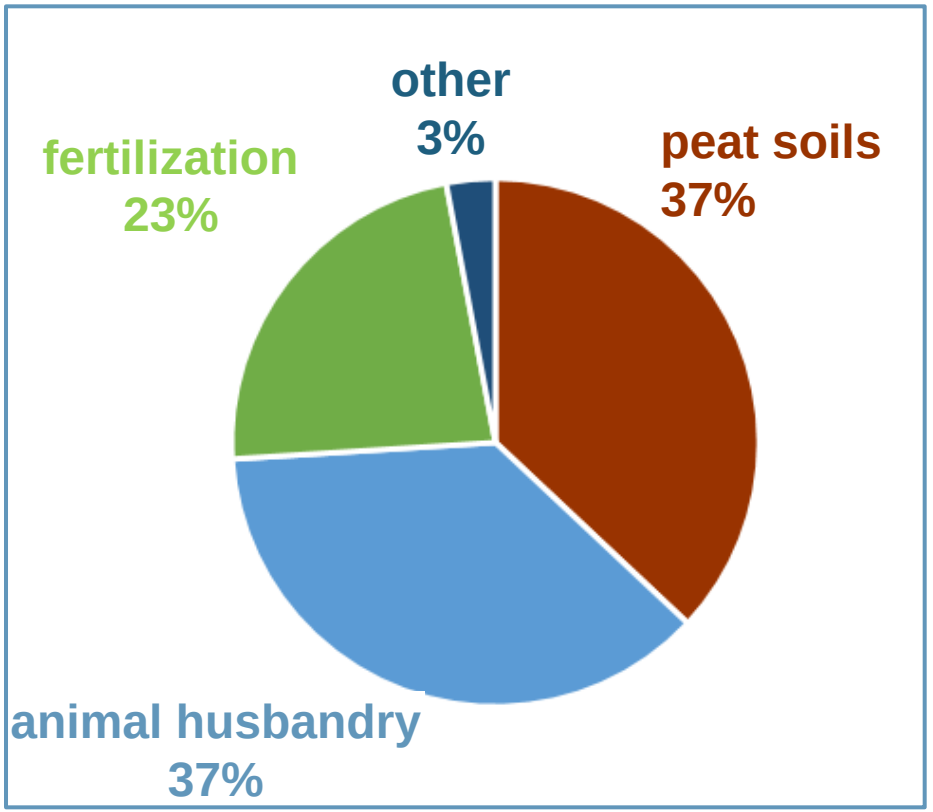
Reduction of GHG emissions

- Paris Agreement: 1.5 °C
- Net zero CO_2 emissions 2050

Drained peatlands in Germany:

- 37 % of CO_2 emissions in agriculture
- 7 % of the agricultural area



Greenhouse gas emissions from agriculture in Germany

Peatland in Mecklenburg-Vorpommern (MV)

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Total peatland area:

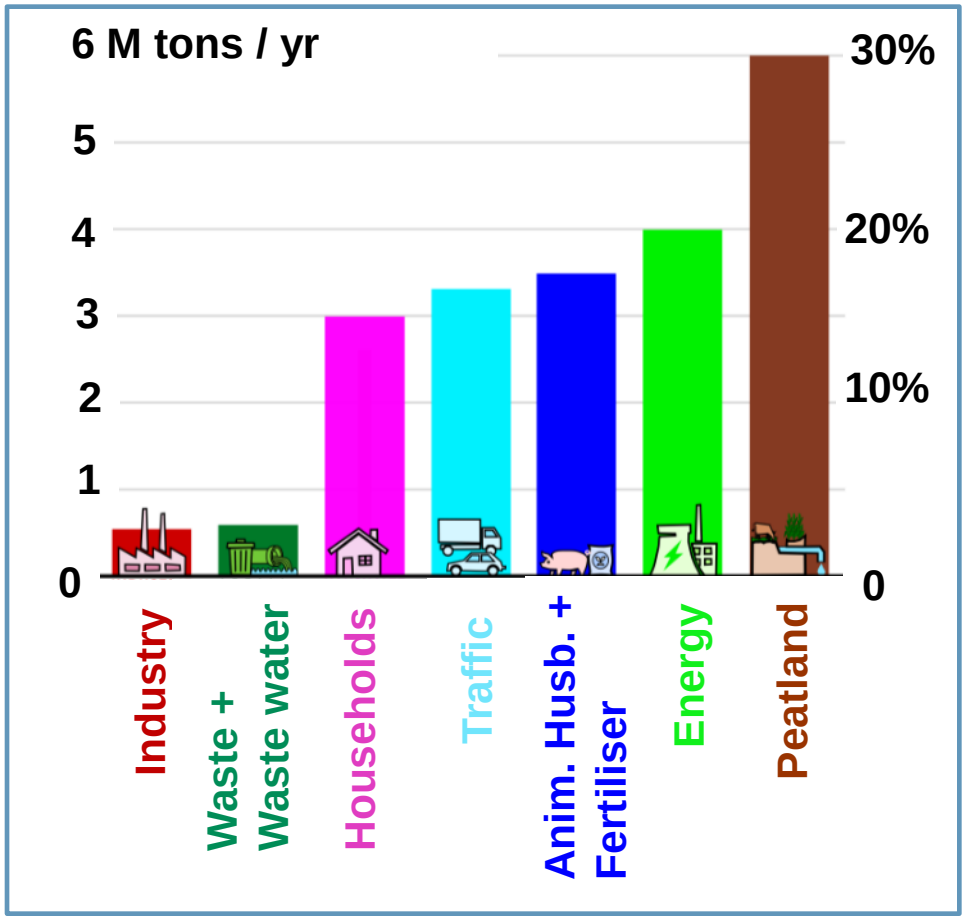
- 288.000 ha (12.5%)

→ 55% in agricultural use

Social costs:

- Damage costs: 25 Euro / t CO_2
  - 150 million Euro / yr
  - 500 Euro / ha * yr

- Damage costs: 100 Euro / t CO_2
  - 600 million Euro / yr
  - 2000 Euro / ha * yr



Greenhouse gas emissions in MV by origin

Paludi-PRIMA - joint project

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Project period: summer 2019 until summer 2022

Project partners:

1. University of Greifswald, Institute of Botany and Landscape Ecology
   - Working Group Peatland Studies and Palaeoecology
   - Working Group General and Special Botany
   - Working Group Experimental Plant Ecology
   - Working Group Landscape Economics
2. Research Centre for Agriculture and Fisheries (LFA MV)
   - Institute of Crop Production and Agricultural Economics

Aim: To put paludiculture into practice

How will we achieve this goal?

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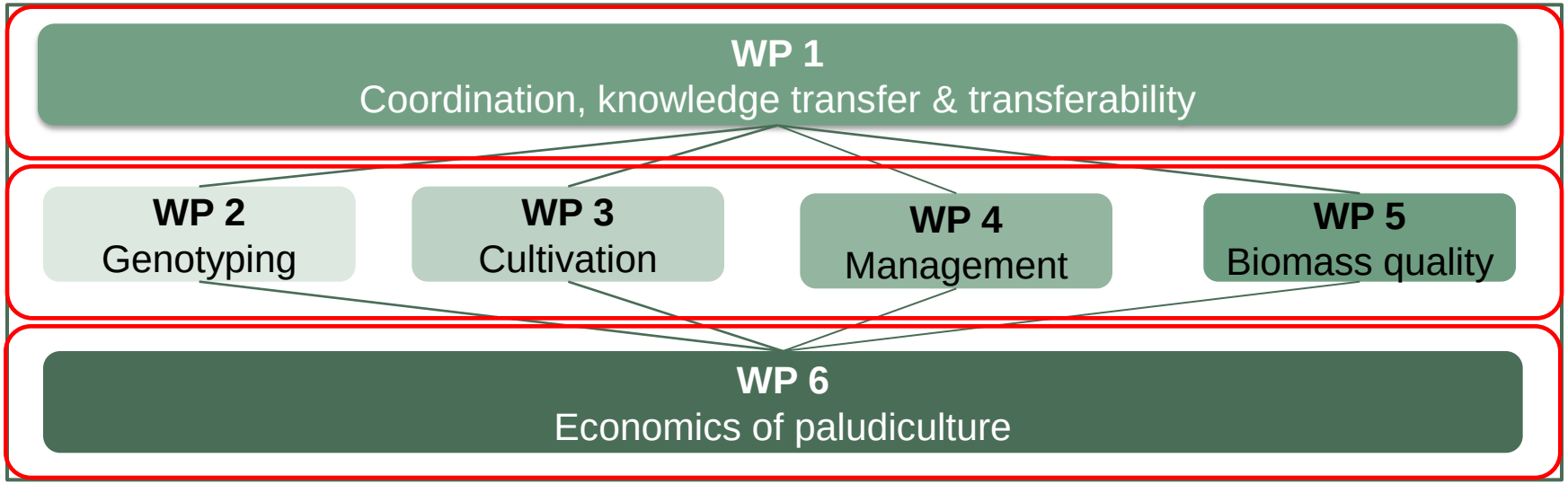
Establishment of a practical experiment and a field experiment with cattail and reed

a. Optimization of the cultivation method to obtain high biomass quality
b. Performing an economic analysis of the cultivation of cattail and reed
c. Identification of the need for adaptation of the legal and political framework

➢ Develop recommendations for farmers, authorities and policy makers.



Practical experiment / Field expriment

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Practical experiment: Cattail (Thypha angustifolia, T. latifolia)

- 10.5 ha of previously drained and agriculturally used peatland
- Modification of the area to regulate water levels
- Use of the “Peene river” for rewetting the area
- Planting of about 50.000 seedlings

Field experiment: Reed

- Length: 200 m, width: 3 m
- outside of the cattail field
- Planting of about 260 seedlings

Paludiculture species

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Cattail (Thypha angustifolia and Thypha latifolia)

- Establishment: planting or sowing
- Yield: 5 – 20 t dry matter per hectare and year
- Harvest:
  - autumn/ winter (material use)
  - summer (biogas plants)

Reed (Phragmites australis)

- Establishment: planting
- Yield: 7 – 24 t dry matter per hectare and year
- Harvest: winter (material use, bioenergy)

WP6: Economics of paludiculture

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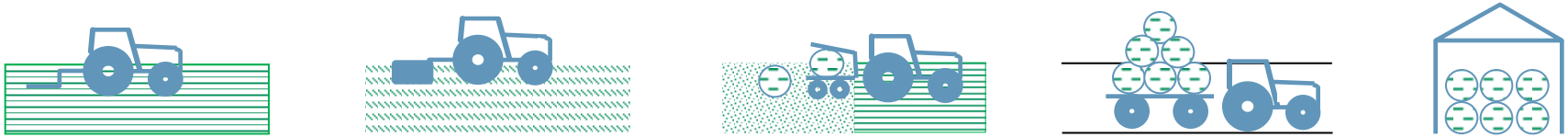
Task 1: Collection of cost data and **working time requirements** for all process steps in the cultivation of reed and cattail.

Task 2: Determination of the economic efficiency depending on biomass quality and use options

Task 3: Influence of framework conditions on the profitability

Process chain



Establishment | Harvest | Crop processing | Transportation | Storage

Work time measurement
Work flow model

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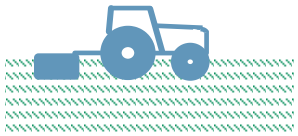
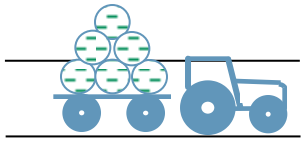
Process chain


Establishment


Harvest


Crop processing


Transportation


Storage

Surface condition
– Size
– Accessibility of the ground

Technology
– Adapted technology
– Technology for other crops

Manpower
– Experience
– Age

Set up at the starting point → Travel to place of work → **Process** → Travel to starting point → Set up starting point

… … …

working elements

Method - Working time measurement

1. Planning and implementation of the time study **(MEZA)**
2. Calculation of planned times **(PLAZET)**

➢ REFA - *Association* for *work structuring*, business *organisation and company* development e.V.

- Determination of the influencing variables:
  - Routes: GPS Tracker
  - set-up times: Surveys

- Working time measurements in practical trials and natural reed stands are planned.

- Working time measurement from the planting in the practical trial was carried out September 2019

Planting of Cattail (Thypha)

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- Two forest planting machines “RPKU” (adapted to rough terrain)
- Manpower per machine : Four
- Height of the seedlings: Thypha latifolia ~66 cm, T. angustifolia ~42 cm
- Two planting densities: 0.5 and 1 plant per 1 m²
- Different surface condition:
  - Partly covered with grass
  - Different peat concentration in soil

Results of planting in practical experiment

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Average time requirement in man hours per ha and machine

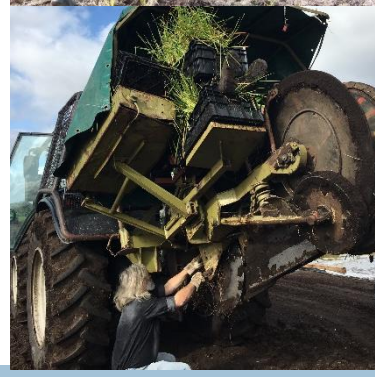
Planting	Loading	Turning	Cleaning	**Total**
26.5	2.1	2.1	1.7 to 3.6	**32.4 to 34.3**

- Time for planting process:
  - Thypha:1 day/ ha (manpower: 4)
  - Short rotation coppice[a]: 1h /ha (manpower: 2)
- Main influence on process time:
  - Soil condition → lack of maschineries

Costs for planting in Euro per ha

	Thypha	Short rotation coppice[b]
Seedlings (number/ ha)	1.900 (5.900)	2.000 (10.000)
planting	2.235	540

[a] wald21.com [b] VTI, 2012



Challenges – current project state

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Legal and financial uncertainties

- Irreversibility of rewetting (loss of use opportunities)
- Financial support for paludiculture is not clear
- Prohibition to convert grassland into other uses

Lack of machineries for the cultivation of cattail

- Use of machines specialized for other crops
  - ➢ High working time and staff requirements
- Development of adapted technology
  - ➢ High investment cost and low utilisation rate

Why are peatlands not only rewetted for nature conservation and climate protection?

Cattail
Innovative products

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Restoration/ Renovation

Disposable tableware

Injection Insulation

www.thyphatechnik.de

Reed
Traditional and innovative products

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Roofs

Insulation

Acoustics

Parasols/ Garden

www.hiss-reet.de

Example from practice

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Heating plant in Malchin (Mecklenburg-Vorpommern)

- Capacity: 700 kW
- Heat production: 4.000 MWh/a
- Fuel: round hay bales (880 t/a), round reed bales (95 t/a), wood chips (150 t/a)
- Heat consumers: private households (apartment buildings)
- Economic efficiency: competitive with gas heating plant

Summary

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- Rewetting of peatlands is necessary to achieve the climate policy goals
- Paldiculture offers the possibility of preserving peatland as a production area
- There are already many possibilities of use for Paludibiomass

Then why is paludiculture not yet cultivated?

- Small data base on the cultivation methods of paludiculture
- The legal and political conditions hinder paludiculture to be put into practice

Paludi-PRIMA aims to show the possibilities for **optimizing the cultivation method** and for **adapting the political and legal framework**

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Thank you for your attention!

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Possible use for cattail and reed

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material use → high quality →
- Construction material
- Insulating material
- Reed for roofs
- Packaging
- Bioplastics

processing residues

energetic use → moderate quality →
- Direct incineration
- Pelletisation
- Wet fermentation
- Solid fermentation

Aim of the working time measurement

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Determination of planned times for ...

- the planning of work processes,
- the calculation of the costs,
- the evaluation and comparison of paludic culture methods and
- the optimisation of work processes and conditions

Planting - working time measurement

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1) Removing plants from the pallet
2) Put plants in boxes
3) Loading boxes onto the trailer

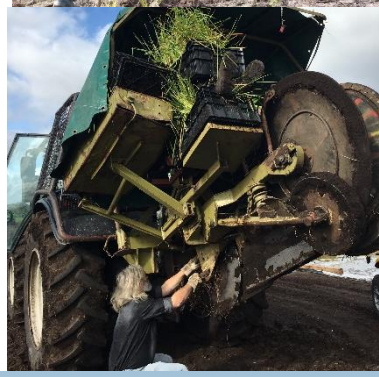
Cycle
Loading plants

4) Loading boxes on planting machine
5) Planting process
6) Reloading the planting machine

Cycle
Planting process

7) Turning

8) Interruptions: cleaning of the machine



Competitiveness
Paludibiomass vs. gas

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