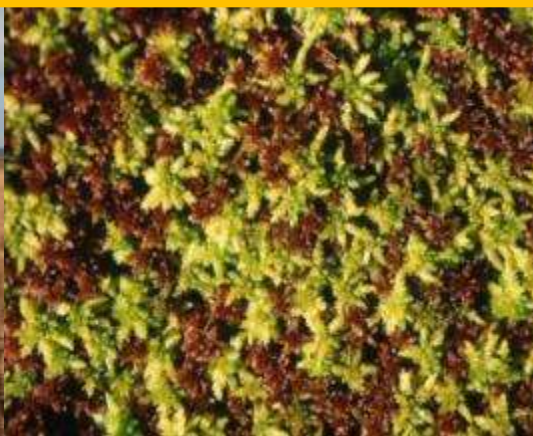




Potential crops for paludiculture in temperate, boreal and tropical climates

Susanne Abel
University of Greifswald



Paludiculture = wet peatland cultivation

- ✓ Preservation of the peat body
- ✓ Reduction of GHG emissions
- ✓ Production of renewable biomass without competition to food production
- ✓ Maintenance of ecosystem services
- ✓ Restoration of habitats for typical mire species



Paludiculture plants

- ✓ Wetland plants
- ✓ Biomass in sufficient quantity and quality
- ✓ Peat conservation → use of aboveground biomass

**Utilisation of the spontaneous
vegetation or
cultivated wetland plants**





Phragmites australis – Common Reed



Highest potential for paludiculture:

- Wide distribution
- Peat forming species
- Productivity: 6-18 t dm/ha*yr
- Well studied
- Established utilisation chain



Phragmites australis – Utilisation



Fuel:

winter harvest for
direct combustion

Raw material:

- for thatching
- fireproof walls
- insulation walls



Pellets



Briquets



Phragmites australis – Utilisation



Pulp and paper production in China

Annual reed yield of 450.000 t of dry biomass



Biomass storage



1. Step of processing: cutting machine

Rozwarowo 'farm' NW Poland 500 ha - reed harvest for thatching



Typha spp. - Cattail



- *T. angustifolia*, *T. latifolia*, *T. x glauca*
- Productivity 4 - 22 t dm/ha*yr
- Sites with high nutrient loads and high water tables
- Paludiculture practices: Germany, USA, Canada

Cattail harvest in Manitoba for combustion, nutrient removal and P reclamation



Photo: R. Grosshans

Typha spp. - Utilisation



Raw material

Aerenchyma
with good
properties for
construction and
insulation



Insulation boards



Typha spp. - Utilisation



Fuel: winter harvest for direct combustion



Densified fuel cubes



Photo: R. Grosshans



Alnus glutinosa – Black alder



Highly productive with water tables 0 to -10 cm -> peat formation

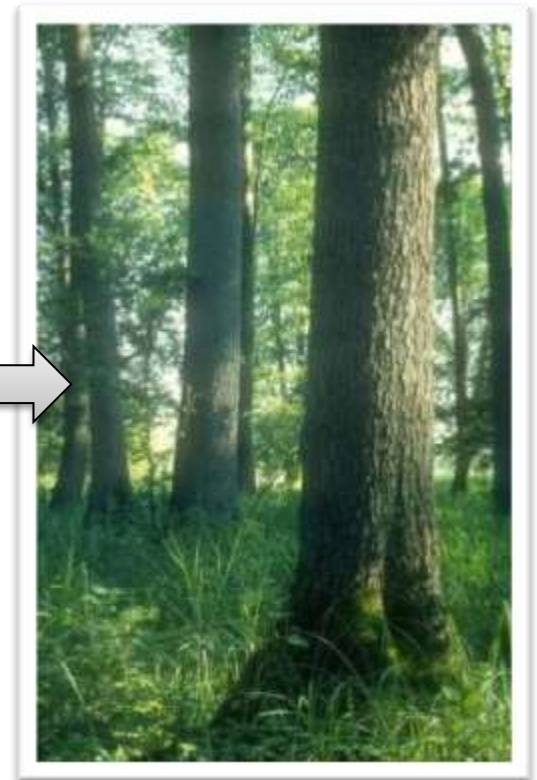
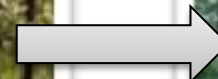
Utilisation

Raw material: timber, furniture and construction wood, veneer

Fuel: biomass from short rotation coppice (4-10 t/ha*yr)



Alnus glutinosa – Black alder



Cultivation trials on a rewetted peatland in NE Germany



Sphagnum spp. – peat moss



Fresh moss biomass as an alternative for peat in horticulture
-> similar physical and chemical properties



4 ha pilot site in NW Germany on former bog grassland

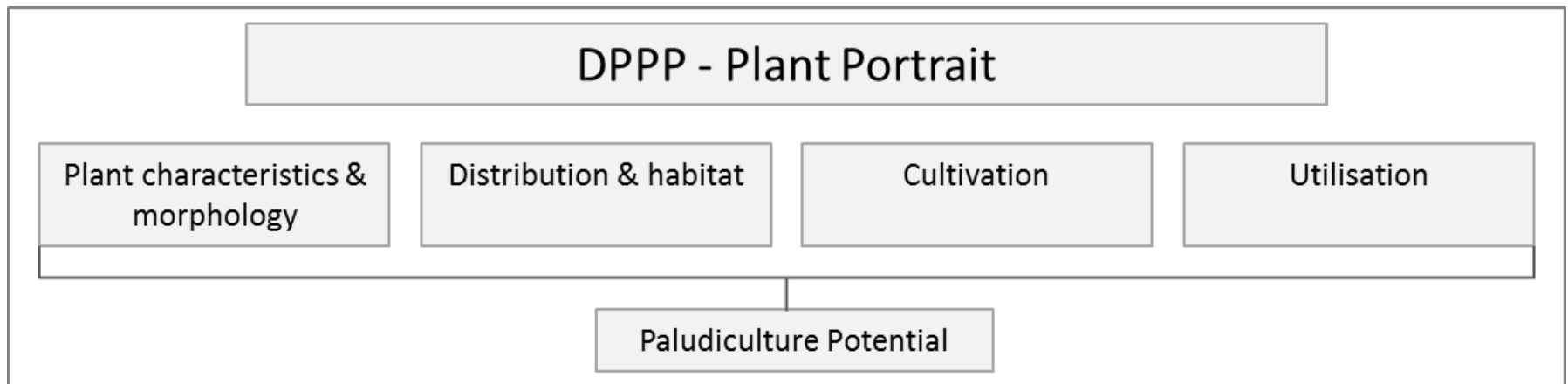
What else? -> DPPP



DPPP = “Database of potential paludiculture plants”

DPPP helps to choose Paludi-crops for various habitats and climates

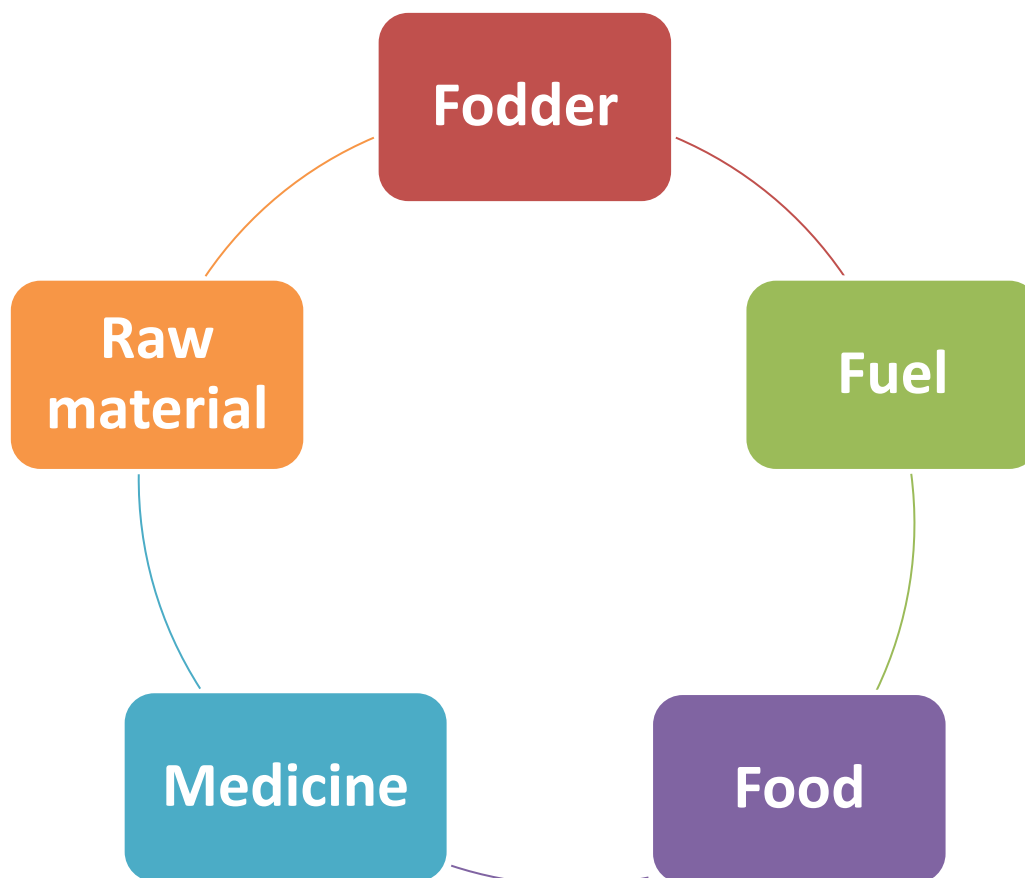
PSF plant database developed for Southeast Asia – by Wim Giessen



DPPP: 1061 plant species recorded worldwide



Potential paludiculture crops



Fodder – temperate zones



Fodder – temperate zones



Name	Distribution
<i>Agrostis gigantea</i> & <i>A. stolonifera</i> Redtop	Europe, Asia, N. America
<i>Alopecurus geniculatus</i> Marsh foxtail	Europe, Asia
<i>Beckmannia syzigachne</i> Sloughgrass	N. America
<i>Calamagrostis canadensis</i> or <i>C. canescens</i> - reedgrass	Europe, Asia, N. America
<i>Glyceria maxima</i> Giant manna grass	Europe, Asia
<i>Lotus pedunculatus</i> marsh bird's-foot trefoil	Europe, Asia
<i>Phalaris arundinaceae</i> Reed canary grass	Europe, Asia, N. America

Fodder – tropical zones



- *Brachiaria mutica*
- *Echinochloa colona*
- *Echinochloa crus-galli*
- *Echinochloa polystacha*
- *Hymenachne amplexicaulis*



Echinochloa colona – picture:
wikimedia commons

Echinochloa polystacha
Picture: tropical forages

Raw material

Name	Distribution	Utilisation
<i>Asclepias incarnata</i> Swamp milkweed	N. America	Fibre, stuffing, cosmetics
<i>Juncus effusus</i> Soft rush	Europe, N. America, Asia	Thatching, mats, baskets, fibre
<i>Juncus acutus</i> Spiny rush, koga	Southern Europe (Turkey), N. Africa	Spikes, baskets, mats
<i>Schoenoplectus</i> spp.	Europe, Asia, America	Matting, chairs, thatching



Latex



Picture: R. Dommain

SE Asia: *Lepironia articulata*



Picture: R. Dommain

Africa: *Cyperus papyrus*



Picture: wikimedia commons, author: Hans Hillewaert

Raw material: wood



Peat swamp forest in Kalimantan

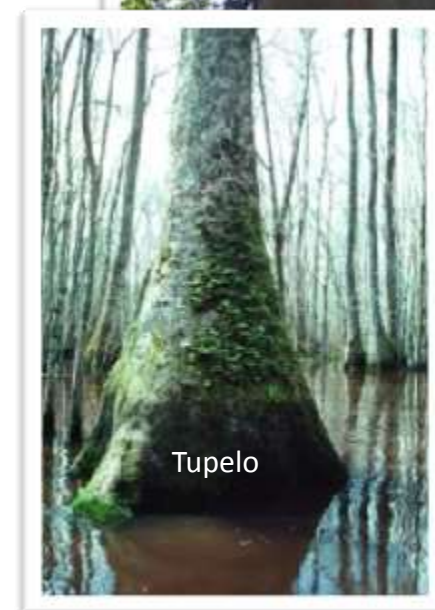
Picture: wikimedia commons - Sergiobaffoni



Picture: wikimedia commons: Sergiobaffoni

Raw material: wood

Name	Distribution
<i>Chamaecyparis thyoides</i> Atlantic white cedar	Eastern N. America
<i>Dyera polyphylla</i> Jelutong	SE Asia (PSF)
<i>Gonystylus bancanus</i> Ramin	SE Asia (PSF)
<i>Liquidambar styraciflua</i> Sweetgum, sweet amber	Eastern N. America
<i>Metasequoia glyptostroboides</i> Water fir	West-central China
<i>Nyssa aquatica</i> Water-tupelo	South-eastern N. America
<i>Pinus mariana</i> , <i>P. sylvestris</i> , <i>P. contorta</i> , <i>P. taeda</i>	Europe, Asia, N. America
<i>Taxodium distichum</i> Swamp cypress	South-eastern N. America
<i>Shorea balangeran</i> Meranti	SE Asia (PSF)



Fuel



Name	Distribution	Utilisation
<i>Arundo donax</i> Giant cane	Southern Europe	Combustion or biogas
<i>Carex</i> spp.	Europe, Asia, N. America	Combustion or biogas
<i>Cladium californicum</i> California sawgrass	Western N. America	Combustion or biogas
<i>Kosteletzkya pentacarpos</i> Saltmarsh mallow	South-eastern N. America, SE Europe	Seedoil for bio-diesel
<i>Phalaris arundinaceae</i> Reed canary grass	Europe, Asia, N. America	Combustion or biogas
<i>Salix</i> spp. Willow	Europe, Asia, N. America	Combustion (woodchips)
<i>Spartina alterniflora</i> Saltmarsh cordgrass	N. America	Combustion or biogas



Food - Sago



Metroxylon sagu

Pictures: wikimedia commons - Toksave

Food



Name	Distribution
<i>Aronia melanocarpa</i> Black chokeberry	N. America
<i>Hierochloe odorata</i> Buffalo or sweet grass	Europe, N. Asia, N. America.
<i>Nelumbo nucifera</i> lotus	Asia; introduced to Europe, N. America
<i>Oxycoccus palustris</i> cranberry	Europe
<i>Rubus chamaemorus</i> cloudberry	N. Europe
<i>Trapa bicornis</i> & <i>T. natans</i> Water chestnut	Europe, Asia, N. America
<i>Zizania palustris</i> Northern wild rice	N. America



Book: Paludiculture Plants of the Holarctic in 2015!



Contact: Susanne Abel - abels@uni-greifswald.de

www.paludiculture.com

www.sphagnumfarming.com



**RRR – Reed as a Renewable Resource
Conference in Febr 2013**

www.rrr2013.de

