

Technology matrix: Which technology suits which crop? – A decision-making guide for wet peatland sites

The transition to wet management is a major challenge. To prevent soil damage, the purchase of the right equipment plays a crucial role. Which equipment is suitable for a specific usage depends on various factors, including the water level, the size of the area, the type of management and crop, the desired area output, the budget, and other site-specific characteristics. The 'Technology Matrix for Wet Peatland Management' serves as an initial guide. The first step in selecting the right machinery is to assess the site conditions and the planned crop. A distinction is made between whether the land is to be used as a wet meadows/ wet pastures or whether cropping paludiculture is planned.

Table A. Wet meadows/wet pastures paludiculture or cropping paludiculture?

Management regime of the peatland site	Wet meadows/wet pastures paludiculture			Cropping paludiculture		
Illustrations* *Bildquellen von links: S. Wichmann, T. Dahms, M. Wenzel, S. Wichmann, S. Wichmann, S. Wichmann	Reed canary gras (<i>Phalaris arundinacea</i>) 	Sedges (<i>Carex</i> spp.) 	Water buffalo (<i>Bubalus bubalis</i>) 	Reed (<i>Phragmites australis</i>) 	Cattails (<i>Typha</i> spp.) 	Sphagnum mosses (<i>Sphagnum</i> spp.) 
Characteristics	Naturally occurring vegetation, extensively managed			Crops specifically grown for biomass production		
Typical plant species	• Sedges (<i>Carex</i> spp.), • Rushes (<i>Juncus</i> spp.), • Reed canary gras (<i>Phalaris arundinacea</i>), • other wet meadow species			• Reed (<i>Phragmites australis</i>), • Cattails (<i>Typha</i> spp.), • Sphagnum mosses (<i>Sphagnum</i> spp.), • Reed canary gras (<i>Phalaris arundinacea</i>)		
Target utilisation	Forage, litter, biomass for material or energy use			Biomass for material or energy use		
Introduction to Technology	See Table B (page 2)			See Table C (page 3)		

lit. [Leitfaden zur Paludikultur \(Nordt et al., 2024\)](#).

Table B. Guidance on machineries for wet meadow paludiculture

Technology type	Applications	Description of the technology	Advantages***	Disadvantages***	Net investment costs*
Small-sized machinery	Near surface water levels (0–20 cm below ground level) are possible; avoid areas with reduced load-bearing capacity (e.g. old tracks) where necessary; particularly suitable for small areas ;	Small tractors (< 2 t unladen weight): with wide or twin tyres where applicable. Single-axle tractors with wheels, tracks or spiked rollers (driver-operated, remote-controlled and hand-guided)**	Low contact surface pressure, very gentle on the sward and the soil, low transport requirements, high manoeuvrability, low purchase costs	Low area output, increased risk of getting stuck, problematic in dense stands	Equipment carrier approx. €23,000 , attachments €3,000–8,000 , radio remote control approx. €3,900
Light (<4 t), adapted grassland machinery	Near-surface water levels (0–20 cm below ground level) with a firm sward; suitable for frequent cornering with soil-conserving tyres	Standard tractors with an unladen weight < 4t, with wide or twin tyres where applicable	Medium area output, versatile	High contact surface pressure; suitable only for firm sward	approx. 16.000–42.000 €
Adapted grassland machinery (heavy (4-8 t))	Water levels 20–45 cm below ground level where the sward is firm; particularly suitable for larger areas	Tractors with all-wheel or crab steering, where applicable fitted with wide or twin tyres or delta undercarriages	Good area output, adaptable	High contact surface pressure, risk of damage to the sward and soil	approx. 100.000–150.000 €
Track or wheel-based special technology	Water levels up to ground level and overflow ; can also be used where load-bearing capacity is very low; for larger areas with planned track layout	Specialised tracked vehicles, converted snow groomers and specialised carrier vehicles fitted with mowers, balers, loading wagons or bunkers**	Very low contact pressure; also fit for use in the event of overflow	Very high costs; significant transport effort; risk of damage to the sward when cornering	approx. 160.000–560.000 €

*No guarantee; significant difference between original price and price of second-hand equipment.

**Autonomous machines are not yet being used in practical applications, but they show potential for this category of technology.

***The ratings („high“, „very high“ etc.) are based on comparison between the machine types shown.

lit. Adjusted table from „[Bewirtschaftungstechnik für eine Standortgerecht Niedermoornutzung](#)“ (MLUK Brandenburg, 2024)

Table C. Guidance on harvesting machinery for cropping paludicultures

Technical feature	Reed (<i>Phragmites australis</i>)	Cattails (<i>Typha</i> spp.)	Sphagnum mosses (<i>Sphagnum</i> spp.)	Reed canary grass (<i>Phalaris arundinacea</i>)
Typical water level	Extremely wide tolerance to water levels; grows at water levels ranging from approx. – 30 cm to +50 cm	Very high, some above ground level (overflow of 0–40 cm)	Very high, constantly wet (2 to 10 cm below the sphagnum tufts; overflow should be avoided)	High to moderately high (summer water level 0–20 cm below ground level; no prolonged overflow is tolerated)
Load-bearing capacity of the surface**	Low	Very low	Extremely low	Medium
Preferred chassis	Tracks, low-pressure tyres, balloon tyres	Tracks	Lightweight equipment, swimming equipment	Wide tyres, low pressure
Intensity of harvesting and maintenance	Annually	Annually	Harvest: every 3–5 years; maintenance mowing: 3–5 times a year	1–2 cuts per year
Crop	Chopped material, bales, bundles (for thatching)	Chopped material, bales*, bundles*	Bulk crop material	Hay, silage, bales
Level of specialisation**	High to very high	Very high	Extremely high	Low to medium
Introduction to Technology	Specialised machinery (track or wheel-based), Seigas & machinery with balloon tyres	(Track-based) specialised machinery	So far crawler excavators with mowing baskets; harvest from embankment; no machinery suitable for large areas available, at best extremely lightweight small-scale or specialised machinery*; in future, autonomous lightweight equipment carriers*	Adapted grassland machinery or specialised machinery; see Table B.

*Not yet established in practice; so far only used experimentally or as part of research projects.

**The ratings („high“, „very high“ etc.) are based on comparison between the machine types/ areas shown. lit. [Leitfaden zur Paludikultur \(Nordt et al., 2024\)](#) & Paludikultur – Bewirtschaftung nasser Moore (Wichtmann et. al. 2016)