

ABSTRACTS OF REED SEMINAR IN SALO, AUGUST 2003

REED SEMINAR, 21st – 22nd August 2003

Salo, Sininen Talo, Finland

**These abstracts can be read in the internet pages of the Interreg IIIA project
"Reed Strategy In Finland And Estonia" www.ruoko.fi**

REED SEMINAR, SALO 21-22.8.2003: LIST OF THE PARTICIPANTS

NAME	ORGANIZATION	SPECIALITY
Hartwig Reuter	Fin Ruokorakentajat Osuuskunta	construction
Teuvo Ranki	Fin Arkkitehtitoimisto Teuvo Ranki	construction
Kimmo Savonen	Fin Town of Turku	biodiversity
Lasse Svahnback	Fin Salon Seudun Kehittämiskeskus	mowing
Mika Ilomäki	Fin Town of Salo	sustainable development
Tapio Aalto	Fin Metsähallitus, Etelä-Suomen luontopalvelut	waterfowl
Kirsi Hellas	Fin Uusimaa Regional Environment Centre	biodiversity, landscape management
	The Association for Traditional Rural Landscapes of SW Finland & SW Finland Regional	
Iiro Ikonen	Fin Environment Centre	biodiversity, landscape management
	Town of Salo & The Assoc. for Trad. Rural	
Eija Hagelberg	Fin Landscapes of SW Finland	landscape management
Timo Harju	Fin Indixon Oy	mowing machines
Pirkko Paranko	Fin Town of Salo	Salo region, biodiversity
Tero Raimoranta	Fin Mietoinen	grazing on seaside meadows
Emil Raimoranta	Fin Mietoinen	grazing on seaside meadows
Mikko Tiira	Fin WWF Finland	landscape management, biodiversity
Timo Klemelä	Fin The Assoc. for Trad. Rural Landsc.of SW Finland	landscape management
Päivi Luotonen	Fin 4H Association Uusikaupunki-Kalanti	landscape management
Päivi Peronius	Fin Vapo Oy Energia	mowing, bioenergy
Päivi Joki-Heiskala	Fin Salon Järvitutkimus	limnology
Kimmo Härjämäki	Fin The Assoc. for Trad. Rural Landsc.of SW Finland	biodiversity, landscape management
	Town of Somero, Meeting of the Finnish and	
Arto Tuominen	Fin Estonian Folk Cultures-project	art
Tiina Niikkonen	Fin Metsähallitus, Itä-Suomen luontopalvelut	biodiversity
Leena Lehtomaa	Fin Southwest Finland Regional Environment Centre	biodiversity, landscape management
Seppo Säilylä	Fin The Assoc. for nature conservation of Salo region	waterfowl
Mirja Kortesharju	Fin Southwest Finland Regional Environment Centre	landscape management
Maria Joki-Pesola	Fin City of Helsinki – Rakennusvirasto	landscape management
Johanna Franzen	Fin Southwest Finland Regional Environment Centre	landscape management, biodiversity
Pirjo Uusitalo	Fin Halikko municipality	Salo region, biodiversity
Jussi Somerpalo	Fin Metsäkeskus	bioenergy
Hannu Klemola	Fin Finnish Association for Nature Conservation	waterfowl
Hanna Vienonen	Fin Perniö municipality	biodiversity
Anna-Stiina Sarlin	Fin Metsähallitus	landscape management
Ülo Kask	Est Tallinn Technical University	thermal engineering
Livia Kask	Est Tallinn Technical University	thermal engineering
Aadu Paist	Est Tallinn Technical University	thermal engineering
Marek Strandberg	Est Centre for Ecological Engineering	construction, bioenergy
Katrin Ildä	Est Tallinn Technical University	bioenergy
Elle Roosaluuste	Est Institute of Botany and Ecology	landscape management
Kaja Lotman	Est Matsalu Nature Reserve	biodiversity
Mats Meriste	Est University of Tartu, Institute of geology	biodiversity, landscape management
Andres Madalik	Est Tansar EF AS	mowing, mowing machines
Mrs. Malik	Est Tansar EF AS	mowing, mowing machines
John Strand	Se Rural Economy and Agricultural Society	biodiversity, limnology
Peter Vestergaard	Dk University of Copenhagen, Botanical Institute	biodiversity, traditional use of reed
Roberts Silins	Lv Lake Engure Fund	management
Mara Janaus	Lv Lab. of Ornithology, Institute of Biology	management
Gabriele Piazza	It Università degli Studi di Bologna	use of reed in building materials
Anu Myllylä	Fin Hermeneus	translation
Helena Karunen	Fin Hermeneus	translation

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"Reed Strategy In Finland And Estonia" www.ruoko.fi

Phragmites australis (Cav.) Trin. ex Steud.:
taxonomy, morphology, biology, ecology and problems

Elle Roosaluuste, Institute of Botany and Ecology, Tartu, Estonia

1. Taxonomy and distribution

Fam. *Poaceae* (R.Br.) Barnhart, nom. cons.

Phragmites species and subspecies

- 1) *Phragmites australis* (Cav.) Trin. ex Steud.
Phragmites australis ssp. *australis* (Cav.)
Phragmites australis ssp. *altissimus* (Benth.) Clayton
- 2) *Phragmites karka* (Retz.) Trin. ex Steud.
- 3) *Phragmites mauritianus* Kunth
- 4) *Phragmites japonicus* Steud.

2. Morphology

- * height of shoots up to 4 m (seldom 7 m),
(height depends on t°, humidity, content of nutrients, management);
- * leaves 1-3 cm (seldom 5 cm) wide;
- * extensive creeping rhizome system (rhizomes 1-3 cm thick) + dense fibrous roots;
- * dense panicles up to 30 cm (sometimes 50 cm) long

3. Biology and ecology

- * *Phragmites australis* - perennial macrophyte and helophyte;
- * cross pollination by wind;
- * dispersal is normally by wind, but also by birds, water and man
- * reproduction by seeds is poor;
- * spreads mainly vegetatively, by rhizomes;
- * species has vesicular-arbuscular mycorrhiza;
- * seed bank is transient (less than 1 year)

Main competition advantages of reed are the next:

- * any lateral bud can develop into a horizontal or vertical rhizome;
- * tall and dense reed stands prevent from reaching light to ground level;
- * the litter mat covers the ground and the other species are not able to germinate and grow there;
- * dense root and rhizome system create very hard root competition conditions for the other species in the soil

The competition ability of reed decreases:

- * by shading from other species
- * in case of severe frost in winter
- * in case of drought

Roosaluste, p. 1/2

- * by strong wave and ice action
- * by grazing and mowing

Substrate and communities

Substrate - very variable, but species likes nutrient-rich habitats

- * organic content 1 % - 97 % (controls shoot height)
- * pH 3,6 - 8,6, usually 5,5 - 7,5
- * chemically controlling factors are: phosphorus (P), potassium (K), calcium (Ca) (controls shoot density)

Communities

In wide scale: marshes, fens, shallow lakes, salt marshes, open aquatic communities

4. Economical importance

- * young shoots grazed by domestical animals (horse, cattle);
- * building material
- * material for mats, paper
- * rhizomes are used as a coffee substitute and basis of an alcoholic drink
- * peat-former in bogs

5. Investigation of the effect of different management activities on the number, height and diameter of *Phragmites australis* shoots (after master thesis E-M.Jeletsky)

In 1999 on Hiiumaa Island the effect of grazing, cutting of reed by machine and by hand was studied. The main results comparing managed and unmanaged areas are the next:

1) grazing

- * the number of shoots is smaller in spring and in autumn
- * the diameter of shoots is smaller in spring and in autumn
- * the height of shoots is smaller in spring and in autumn

2) cutting by hand

- * the numbers of shoots are not different in spring but in autumn it is smaller
- * the diameter of shoots is bigger both in spring and in autumn
- * the height of shoots is bigger both in spring and in autumn

3) cutting by machine

- * the number of shoots in spring is smaller but there is no difference in autumn
- * the diameter of shoots is smaller in spring and in autumn
- * the height of shoots is smaller in spring and in autumn

Roosaluste, p.2/2

Managing the Ramsar site , Lake Engure Nature park

Roberts Šiliņš, Lake Engure Nature Park , Latvia

History

- Lowering the water level in 1842
- Beginning of 20ties – grazing, hay making activities around lake (shore meadows in 30ties – 50ties.
- First data about bird fauna – since 30 ties. Regular monitoring since 1958.
- Establishing nature reserve in 1957 – grazing & moving stopped.
- Ramsar site in 1995:
- high biological diversity (800 plant species, 185 breeding bird species, almost all Latvian species during migrations.
- Many rare and endangered species: 40 especially protected plant species, 2 globally threatened and 42 threatened bird species.
- More than 20 000 breeding waterfowl.
- Enlarging the area and establishing nature park in 1998. Total area 19 000 ha
- Management plan for Lake Engure Nature park. Finished in 2000, with assistance of Swedish EPA.

Project infrastructure

Project is financed by:

- LIFE-Nature (75%)
- Latvian Environmental protection fund (16%)
- Local municipalities (2%)
- Latvian Fund for Nature (2%)
- Lake Engure Nature park fund (1%)

Values of Lake Engure Nature park

Birds:

- 186 breeding bird species (83% of Latvian species), 22 Bird Directive Annex 1 species
- During spring migrations – Whooper swan and Bewicks swan (250, 170)
- During autumn migrations – White fronted geese and Ben geese (800, 1000)
- Concentration of 900 Common cranes before migrations
- Moulting Goldeneye (3500)

44 mammal species, 4 Habitats Directive Annex 2 species

14 fish species, 5 Habitats Directive Annex 2 species

19 EU importance habitats (Habitat Directive Annex 1), 5 priority habitats

Plants – 80 rare and protected species, 22 from 32 Latvian orchid species.

Main problems in Lake Engure Nature park

- Overgrowing of the coastal and shore meadows
- Overgrowing of calcareous fens
- Overgrowing of lake by reed (monotonous stands)
- Invasive species (American mink, Marsh harrier)
- Forest cutting
- Lack of control over protection rules
- Uncontrolled tourism, lack of tourism infrastructure

Silins, p. 1/2

Long-term objectives for management and protection

- Ensure sustainable development of the coastal area, by balancing interests of local population and nature conservation
- Maintain biological diversity of LENP – rare and typical ecosystems, habitats of protected species, typical and original landscapes, optimal populations of birds and continuing correspondence to Ramsar Convention criteria.
- Involve municipalities and other stakeholders in nature conservation and maintenance of cultural-historical heritage
- Support development of nature friendly tourism, involving local population
- Ensure control over protection rules

Objectives for management and protection 2000-2010

Nature conservation

- Maintain diversity and numbers of breeding and migrating bird species
- Slow down the overgrowing of the lake by reed and accumulation of organic sediments
- Maintain coast and dune area, coastal meadows
- Restore and maintain meadows along lake shore and on islands
- Maintain forest habitats, elaborate forest management plan
- Ensure research and monitoring for management needs
- Ensure maintenance of fish resources in the lake
- Maintain invertebrate fauna and its habitats in LENP

Sustainable development

Management measures – LIFE Nature project

Several priority management measures are performed:

- Restoration of shore meadows (4 meadows on sea and lake coast, total appr. 100 ha)
- Maintenance of restored meadows by grazing
- Cutting reed in the lake, appr. 330 ha/year
- Purchase of forest compartments in reserve zone (appr. 50 ha)
- Mapping of habitats of EU importance
- Monitoring management effectiveness

Management of reed in Lake Engure Nature Park

- Cutting of reed for management purposes with Truxor reed cutter 150 ha per year (in summer)
- Cutting of reed for roofs 12000 bunches per winter
- About 20 local people involved in reed cutting business
- Maximum amount that could be cutted is about 30000 bunches
- Costs for one bunch depending on reed quality are 1-1.3 euro
- Costs for one square metre of reed roof are about 30 euro

Silins, p. 2/2

Coastal reed communities in Denmark – biodiversity and reaction to cutting

Peter Vestergaard
University of Copenhagen
Botanical Institute
Øster Farimagsgade 2D, DK-1353 Copenhagen K, Denmark

Abstract

Most of the *Phragmites* reed beds in Denmark are coastal (brackish). Traditionally, reeds, harvested in winter, were mostly used for roofing.

In a regional study of Danish coastal meadows seven reed communities could be defined. The number of accompanying species increased from hydrolittoral to upper geolittoral reed beds, parallel to a decline in *Phragmites*. The biodiversity of reed beds in SE Denmark is increased by presence of southern or continental species.

Phragmites strongly reacts to grazing. When grazing ceases, *Phragmites* may take over in a few years, dependent on whether or not *Phragmites* was present in the previously grazed area. The Species diversity is lower in reed beds than in grazed meadow at same elevation, due to litter accumulation and more uniform soil surface, and due to the dominance of *Phragmites*.

In a seven year study the reaction of *Phragmites* to summer cutting was found to vary with elevation. At high elevation *Phragmites* was little affected. At middle elevation *Phragmites* declined strongly in frequency, shoot density and shoot length, and the reed bed was transformed into meadow. At low elevation the frequency of *Phragmites* was unchanged, but shoot density and shoot length were reduced. Diversity response to summer cutting: No significant response was found in species richness, but the species diversity increased significantly with the decline of *Phragmites*.

References:

- Baggesgaard Rasmussen, H., Bjerresø, G., Böcher, T.W. & Ilver, K. 1948. Rørsumpvegetationen i Danmark. – Ingeniørvidenskabelige Skrifter 1948 Nr. 1, 107 pp.
- Gyrsting, L. 1993. Rørsumpe. In: Ovesen, C.H. & Søgård, S. (eds.). Naturplejebogen. – Ministry of the Environment. pp. 118-124.
- Pedersen, A. 1962. Det xerotherme floraelement ved de sydlige indre farvande. – Flora og Fauna 68. årg., hefte 1:17-42.
- Schierup, H.H. 1987. Tagrørsarealers økologi, drift og udnyttelse. - Marginaljorder og Miljøinteresser. Teknikerrapport no. 33. Ministry of the Environment. 45 pp.
- Vestergaard, P. 1978. Græsningens betydning for vegetationen på øst-danske strandenge. In: Jensen, A. & Ovesen, C.H. (eds.). Drift og pleje af våde områder i de nordiske lande. – Reports from the Botanical Institute, University of Aarhus 3:144-155.
- Vestergaard, P. 1994. Response to mowing of coastal brackish meadow plant communities along an elevational gradient. – Nordic Journal of Botany 14:569-587.
- Vestergaard, P. 1998. Vegetation ecology of coastal meadows in Southeastern Denmark. – Opera Botanica 134:1-69.

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Wetland construction in Sweden - Reed: problems and possibilities

Dr. John A. Strand

Rural Economy and Agricultural Society (REAS) and Wetland Centre, Halmstad University, Sweden

Large areas of wetlands have disappeared in Sweden during the latest 150 years of draining of agricultural land. It is estimated that only a few percent of the wetlands are still left. It has been acknowledged that wetlands play an important role in the nutrient transport from land to sea. Wetlands function as nutrient traps and leads to a decreased nutrient loading to the sea. The reduction in wetland areas has led to increased nutrient transport to the sea with major algal blooms, oxygen depletion in bottom water and fish kill as results. Furthermore, wetlands are habitats for a number of plant and animal species that have become rare or extinct due to wetland drainage, or changes in water regime and wetland management.

Therefore, a strategy where wetlands are re-created has been adopted in Sweden. In 1999, 15 Environmental Quality Objectives were adopted. One concrete aim was to construct 12 000 hectare of new wetlands in the agricultural landscape by 2020. Landowners get subsidies to cover construction costs, and additional funding for future management of the wetlands (yearly mowing or cattle grazing). Furthermore, municipalities can apply for environmentally sound projects (for example large-scale wetland construction), where the government covers 30-70 % of the total cost (Local Investment Programmes). One such project is managed by the REAS together with the municipalities of Halmstad and Laholm on the Swedish West Coast. In this project 240 hectares of wetland will be constructed by 2004.

Current knowledge implies that an optimal design for wetland construction regarding both nutrient retention and biodiversity is shallow wetlands with gently sloping littoral zones and moderate vegetation. This leads to obvious problems with reed expansion and subsequent impaired ecosystem functions (both for retention and biodiversity).

To reduce long term reed expansion it is important to have a sound management strategy. Regular mowing and/or cattle grazing are a basic requirement but not always enough. Winter harvesting (from the ice) is easy to perform but does not reduce reed growth. Therefore we construct the wetlands so it is possible to adjust the water level easily, and also permit complete emptying of the wetland. Greenhouse experiments have shown that water level fluctuations decrease reed growth, where the mechanism seems to be that reed spends energy constantly adjusting between below-and aboveground biomass in the changing environment. Reduced water level, or complete emptying, will also lead to increased possibilities to reach larger areas of the littoral zone with machines for mowing. It is important to realise that emptying and mowing may be detrimental to biodiversity if it is done during the breeding season.

A concept of Production Wetlands has also been tried in Sweden. Here, wetlands are specially designed to optimise reed growth. Nutrient rich water is diverted to the wetland. The reed grows and reduces nutrients in the water. The plants are then harvested and used for biogas production, and the nutrient rich rest product is spread on farmland as fertiliser. Only one pilot production wetland has been constructed so far and the results are not yet ready for evaluation.

Strand, p. 1/1



Päivi Peronius, Suo- ja Vesi Kiinteistöyksikkö, Finland

REED MOWING AT LIMINGANLAHTI BAY

Liminganlahti is located in the Northern Finland, near the city of Oulu. The effect of land uplift at the Liminganlahti Bay is strong and the coast is subject to continual change. Liminganlahti Bay is one of the most important waters for birds in Finland. It belongs to the national programme for protecting water areas for birds and also Natura 2000 areas in Finland. During migration, more than 20 000 birds may be resting at Liminganlahti Bay at the same time.

Mowing reed at Liminganlahti Bay

Common reed grows in an area of about 1 200 ha at the Liminganlahti Bay. In the area of Pitkänokka in Lumijoki, there is a 2 km wide stretch of reed growth.

The growing areas of the reed have become eutrophic and they are exposed to nutrient loads. By mowing and transporting the mown vegetation away, a part of the nutrients are taken away from the coastal areas and eutrophication is at the same time diminished. Removing the dead reeds in the winter before they fall down and disperse, improves the oxygen situation in the water.

By removing the dead reeds of the previous year, an open meadow scenery is created for the beginning of the bird nesting season. Mowing improves the living conditions of waders and anseriformes.

Reed was mowed in 1994-1996 at Liminganlahti Bay. The experimental project was funded by Vapo Oy and the Agricultural Industry District of Oulu. A part of the autumn mowing was done in co-operation with the Environmental Centre of Oulu.

The mowing was performed in the early spring (March-April) and in the autumn (August-October). The mowing was not done while birds were nesting. In years 1994-1996, the common reed was mowed in the area of 314 hectares in total. The annual mowing was performed in different areas. Before the mowing, the area was studied in site, with the purpose of finding areas particularly suitable for mowing.

Possible uses of reed were energy production, pulp production, and support material for composting. Burning tests were performed at the power plant in Oulu. The green vegetation was used as support material for composting.

Peronius, p. 1/2

Conclusions on the Experiments

A remarkable amount of nutrient-containing biomass can be removed with reed mowing. More nutrients are removed by autumn mowing when vegetation is green. Mowing can prevent the paludification of the coastal meadows and improve the living conditions of birds. Geese were not disturbed by the harvesters.

In winter and in spring the snow gathered in the reed growth impaired the mowing. Mowing in the summer and in the autumn was impaired by stones. Due to the difficult conditions, the harvesting costs were high.

The reed for the use as fuel was harvested in the early spring, when the chaff is low in moisture and easier to harvest. The volume weight and energy content of the common reed chaff is low, therefore the transportation costs were heavy. Due to this, the places of utilising must be close to the mowing areas. Reed can be used as fuel, but mowing of reed is expensive and the fuel price becomes too high. Too long reed chaff created problems in the power plant.

The common reed used as a support material for composting was cut green in the autumn. Reed chaff cut in the autumn is very well suited for the use as a support material for composting. The temperatures in the composts where reed was used were higher than in the composts where there was no reed. The chaff does not have to be as short and of as even quality as when used for fuel.

Peronius, p. 2/2

BUILDING WITH COMMON REED AND CLAY

Teuvo Ranki
Master of Science (Architecture)
Turku, Finland
Tel. + 358 50 322 44 01
teuvo.ranki@kolumbus.fi
www.kolumbus.fi/teuvo.ranki

Man has made buildings out of clay throughout time. As it is a widely available and easily workable material, the use of clay has been only natural. Clay has been used to build residential buildings, towns, and even fortresses. A large part of the world's population still makes clay buildings to live in. Building with clay has also been known in Finland for a long time. Clay buildings can be found all over the country, and the oldest of them are over two hundred years old.

There are numerous different clay building techniques. The nature and properties of clay affect the choice of technique. Some clay types can be used in building as such, sometimes gravel is added, and sometimes light organic material, such as wood chips, straws or common reed.

The light organic material improves the insulation of clay material and also acts as reinforcement. The organic material should be dry, and it must not cause growth of micro organisms or decomposing in the structures. In this sense, common reed is a highly feasible material.

Clay has some properties that speak for its use in construction:

- Low balance humidity and high moisture resistance. The balance humidity of well dried clay is about 3%. This also helps the wooden structures and other organic materials inside the clay to stay dry.
- A clay structure "breathes". The lack of a steam-proof layer in a clay structure allows humidity to permeate the structure (a plastered clay wall is, however, airtight).
- Clay is completely non-combustible, because clay is the finest mineral soil. If organic materials are mixed with clay, the clay also improves their fire-safety.
- A massive clay structure is an efficient sound insulation. Clay is also an acoustically suitable material.
- Pure clay is odourless and emits no harmful substances.
- Clay has been found to prevent harmful electromagnetic radiation.
- Clay has good thermal capacity which helps keep the room temperature steady. This property also provides opportunities for storing energy.

The beneficial properties of clay have been noticed, and clay building is again gaining popularity around the world. The Finns have also been active with clay for the last 10 years. Research has been carried out, training has been arranged, and new clay buildings have been built in different parts of the country.

Ranki, p. 1/3

The problems brought out in public suggest that the world is not yet ready when it comes to construction methods. New, unprejudiced alternatives are also worth trying. As an ample and quickly regenerating material, common reed is ideally suited alongside clay and wood in the development of safe building methods for the new millennium.

Literature on building with clay:

**RAKENNUKSISTA SAVIRUUKKISEINILLÄ
(On buildings with clay works walls)**

Maamies magazine, issues 20–22, 1878

Detailed instructions on construction of solid clay buildings.

SAVIRAKENNUKSISTA (On clay buildings)

Teknillinen aikakauslehti 1922, p. 262–269.

An article on clay building experiments and building instructions.

SAVIRAKENNE (Clay structure)

Kätevyyden käsikirja 1962, p. 92–96.

Clear and good instructions for making solid buildings.

LEHMBAU – HANDBUCH, 321 pages

Germany 1994.

A thorough book on building with clay by Gernot Minke. Also available in English.

SAVIRAKENTAMINEN – kevytsaviteknikka (Clay building – light clay technique), 169 pages

RAK 1994

The Finnish edition of a book written by the German Franz Volhard in the 1980's. Includes e.g. a very comprehensive list of literature.

SELVITYS SAVIRAKENTAMISESTA – Raportti koerakentamisesta kevytsaviteknikalla (A study on clay building – report on experimental building with light clay technique), 92 pages

Department of Architecture at the Helsinki University of Technology, publication 1994/8

KERAMIIKAN MATERIAALIT (The ceramic materials), 304 pages

A comprehensive handbook by Heikki Jylhä-Vuorio that explains e.g. the properties of clay

LUONNONMUKAISET RAKENNUSAINIET (Organic building materials), 96 pages

Helsinki University of Technology / Rakennustieto 1998

Ranki, p. 2/3

Links related to building with clay and straw bales:

www.kolumbus.fi/tj.lehtonen
www.kolumbus.fi/teuvo.ranki
www.azstarnet.com/~dcat/barriers.htm
www.bival.dk/halm
www.bionetz.de/lit_080.htm
www.builderswithoutborders.org
www.bshf.org (Building and Social Housing Foundation)
www.byokologi.dk
www.chelucto.ns.ca/~aa983/strawhouse.html
www.codesign.org/edi/eden/ecoschools-resources.html
www.deatech.com/cobottage
www.deatech.com/natural
www.dr.dk./halmhuset
www.dwf.org (Development Workshop)
www.econest.com
www.eco.net.dk/english
www.earthshib.org
www.envirolink.org/orgs/earthsweet
www.fo.dk/fo-egebjerg
www.gnat.net/~goshawk
www.greenbooks.com
www.greenbuilder.com/dawn
www.greenbuilder.com/directory
www.grenoble.archi.fr
www.hkt.fi/kirjasto/cool2.htm
www.hut.fi/Yksikot/LRT
www.io.com/whtefunk/sbat.html
www.kolumbus.fi/olkigalleria/rakennus.htm
www.lob.dk
www.luomura.com
www.moxvox.com/fosb.html
www.newsociete.com (books)
www.peaceweaver.com
www.raadvad.dk
www.solstice.crest.org/strawbale
<http://strawbale.archinet.com.au>
www.strawhomes.com
www.xmission.comnshea/straw
www.zen.co.uk/home/page/deaftdesign
www.zianet.com/blackrange
www.users.globalnet.co.uk
www.lightearth.co.uk

Use search terms **clay building** or **earth house** to find more links on the subject.

Ranki, p. 3/3

Common reed as a building material: roofs, walls, insulations

In Finland, common reed is a forgotten and unknown building material.
Common reed is a widely disliked, but definitely useful plant in our water systems.
Common reed consists of 20% of minerals and the rest is air.

Roof covering from common reed, 35-40 cm, useful life 70-100 years

Closest models in Estonia and Germany. We can develop our own roof model in Finland, as there are no traditions on common reed roofs.
The roof can be e.g. a light common reed roof in connection with repairs of an old roof or just UV protection of felt covering or a reed roof element for prefabricated houses (for exports).
Common reed roofs: 260 m² detached house, sauna and barn, U. Paananen, Pihtipudas, 2003.
100 m² barbecue shelter in Oittila, a barn in Porvoo, saunas in Laukaa and Jämsä.

Common reed insulating sheet, (Berger sheet) 50 mm, thermal conductivity 0.04-0.06 W/mK.

Manufactured in Finland from 1935-1944, nowadays imported. Still in use e.g. in Helsinki, in Saarijärvi from as early as 1941, Pihtipudas and Jyväskylä in 2003.
Ample options for use of common reed sheet in Finland: insulating sheet in wooden structures, as "boarding" in concrete elements, as thermal rendering sheet and soil frost sheet, sound insulation etc.
The objective is to buy a sheet making machine and expand production to exports.

Common reed insulation, made on site in the same way as the Berger sheet. www.kaanee.cjb.net/

The common reed insulation is attached directly to the framework or an old log wall with wire.

Common reed bale insulation, ca. 150 kg/m³, 0.04-0.06 W/mK, www.kaanee.cjb.net/ruokopaali

The simplest way to produce 42 cm thermal insulation suited for a low-energy house using farm machines. The insulation can be plastered with clay.
Tried in Jyväskylä on floor and roof in 2003.

Common reed element insulation, goal: common reed is pressed directly to the floor, wall and ceiling elements. This requires co-operation with element manufacturers.

Light common reed insulation, future: e.g. flax fibre could be used as the binding agent of common reed insulation. This requires co-operation with flax insulation manufacturers.

Common reed furnishing sheet, future: common reed could be used as support or lightening material in peat or paper pressing.

Reuter, p. 1/2

Common reed chippings insulation, tried, not researched: chopped common reed acts as insulation alone or as support material of wood chips, cutter chips or peat.

Summary/conclusion:

- Nutrients and minerals flow from the fields to the water systems.
- Common reed grows in water with high nutrient content.
- At the end of the growing time of common reed the nutrients are returned to its roots, while minerals and silicic acid remain in the plant.
- The plant gathers the nutrient floating in water for new growth.
- *Common reed cleans water.*
- Cleaning of waters benefits the national economy.
- By cutting common reed in the winter it can be utilized as water cleaner, soil improvement and as raw material in building industry.
- Repeated cutting, collecting and utilisation can be compared with cultivation.
- Agriculture, silviculture and fishing industry should pay a compensation for cultivation.
- Cultivation of common reed, consequent improving of water quality, environmental care and industrial utilisation of common reed should be a national obligation.

Teuvo Ranki's presentation here.

Reuter continues:

Use of common reed in purposes other than building industry:

Compost stabilising agent, Research of the University of Jyväskylä, 2001.

Chopped common reed is used e.g. as stabilising agent of municipal waste.

Fallow, covered cultivation and soil improvement, tried, not researched

The snow is rolled tightly on the field in the winter (frostbite kills the weeds).

Common reed is chopped directly on ice and spread on the field as insulation.

The insulation delays the melting of the field.

The choppings can be used as a filter field for light suction dredging waste.

Chopped reed acts as a covering material in the summer that prevents drying of the field and growth of weeds and prevents the freezing of the field in the following winter.

In the next spring the chopped reed is ploughed under the earth to lighten and improve the soil.

Burning of common reed, water system improvement, environmental care, tried, not researched

It is known that our water systems are suffering from oxygen depletion.

It is known that the mud layer is acid.

It is known that ash neutralises acidity.

Planting of common reed, future goal

It is worthwhile to plant common reed on old swamps (annual yield ca. 5-12 t/ha).

Common reed generates oxygen.

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Resources and, Burning Characteristics of Reed and Possibilities to Use it in Energy Production

Ülo Kask, Aadu Paist, Livia Kask
Thermal Engineering Department Tallinn Technical University
Kopli 116 Tallinn 11712
Phone: +372 620 3902 Fax: +372 620 3901 e-mail: apaist@sti.ttu.ee; ykask@sti.ttu.ee

Wider use of domestic renewable energy resources as wood (-based) fuels, reed and peat, making more improved fuels as pellets and briquettes and working out modern combustion equipment assumed that we know exactly the properties of these fuels. The different domestic fuels properties are investigated in the Thermal Engineering Department Tallinn Technical University in many years and one of them is introduced in this presentation.

Most of the fuels that are being used to produce the thermal and electrical power are non-renewable. Biomass is the most suitable renewable energy resource in Estonia. Hitherto – one kind of biomass – plants of wetland – has almost not been used. There are plenty of wetlands in Estonia that have reasonably high productivity of biomass. The area of Estonian wetlands is approximately 26 000 hectares. Wetlands are characterized by rich flora, which gives a remarkable amount of biomass. Thickets of reeds as well as natural bush are the most suitable for energetic raw material.

The largest thickets of reeds (reed beds) of Estonia are situated in the Peipsi Lake and in the Võrtsjärv, in Matsalu (in the delta of Kasari river) and in the Väike Väin. The area of thickest of reeds of the Matsalu wetlands are approx. 3 000 ha (some data refer to 4 000 ha). In the Võrtsjärv, the areas of thickets of reeds are approx. 1 200 ha. In the Saare county, the reed harvest from ~1 000 ha is assessed to be potential.

The harvest of biomass from 1 hectare from thicket of reeds depends on several circumstances, for example the location of thicket of reeds, the components of soil etc. Researches show that approx. 1-1,5 kg dry substance per 1 m² is growing in the natural wetlands, but adding nutritive the productivity can reach up to 4 – 5 kg/m² in a year [1]. That makes 10 – 15 t of dry biomass to one hectare. That kind of yield can be expected from the artificial wetlands (wetland cleaners), where is processed sewage of settlements or farms.

One advantage to use the plants of wetland (reed, cattail) in energy production is the fact that these plants will disengage from water in the end of their growth period and will need no extra drying.

Implementation of technologies of processing and using the biomass in energy helps to create new jobs in agriculture as well as in other sectors of economy and evolve the regional development. The local currency circulation will improve and there are also possibilities in increase of capital expenditures and export potential.

There could be significant reduce in the emission of solid particles into the atmosphere, if the biomass of wetlands would be used to produce thermal and electrical power.

Reed as a fuel is fairly specific and therefore needs special furnaces and burning techniques. It is likely usable in straw boilers, too.

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Biofuels stations should be installed to the districts where collection and storage of biomass is optimal. In such stations wood wastes; straw, hay, reed etc harvested from fields can be burned.

One possibility could be grafting the biomass through granulation or hydrolysis (result is ethanol) and selling it to small consumers, to mainland or to abroad.

The dry matter of above water plant parts of natural thickets of reeds is 7 - 10 t/ha. In a two investigated areas – wetlands of Matsalu and Saare county – optimal reed harvest is from 3 500 ha that gives up to 0,27 PJ (0,07 TW·h) primary energy in a year.

Total area of Estonian thickets of reeds is approx 26 000 ha, based on the wetlands map composed by Institute of Geology of Tartu University. Primary energy collected from that area would be 1,98 PJ (0,55 TW·h) in a year, because harvest is thought to be possible from 2/3 of the area.

Reed and cattail can be grow in the artificial wetlands (wetland cleaners), where is processed sewage of settlements or farms. The productivity can reach up to 4 – 5 kg/m² in a year. That makes 40 – 50 t of dry biomass to one hectare.

In the artificial wetland in the Kõo village waste water plant has been operated more than a year. The area is 1 ha. In the Häädemeeste the area of artificial wetland is 0.5 ha and in the Tännasilma there is 69 ha semi-artificial wetland [2].

In the Tännasilma the dry matter content of phytomass is 2.1 kg/m², in the Kõo village 1.82 kg/m² and in the Häädemeeste 1.61 kg/m². On these areas the energy resource of cattail can reach up to 4.4 GW·h per year [2].

Wetland wastewater treatment plants have a big potential in Estonia, mainly in the villages and rural areas. It needs 10 m² wetland areas per capita.

In Estonia there are 939 villages and rural areas where number of inhabitants is between 100 – 2 500 and the total amount of inhabitants there is approx. 400 000. If we can solve the wastewater treatment in those villages on the basis of wetlands, we will need 400 ha artificial wetlands. The yield of reed from these artificial wetlands can reach up to 16 000 t/year and primary energy content up to 67 GWh/year.

So far the use of reed has been only for roofs and isolation materials. Harvest and handling residues have been burned on the basis of one time license.

Burning characteristics of reed and cattail

Nr	Plants	Area	W^r , %	$Q^d_{b_s}$, MJ/kg	A^d , %	Volatile matter, %	Elementary analysis, %			
			In spring				N, %	C, %	S, %	H, %
1	Reed	Suur väin	14,4	18,2	5,8	-	0,4	45	0,1	6,8
2	Reed	Mullutu bay	10,9	18,3	4,9	80,7	0,3	46	0,1	6,8
3	Reed	Väike väin	10,1	18,5	3,5	79,9	0,4	46	0,1	6,7
4	Reed	Lake Vörtsjärv	16,3	18,1	5	81	0,3	46	0,1	6,5
5	Reed	Rocca al Mare	16,5	18,9	3,7	80,2	0,4	49	0,1	6,4
6	Heads of Cattail	Viljandi mudlake	44,6	19,6	3,7	79,7	1,8	47	0,1	6,6
7	Stems of Cattail	Viljandi mudlake	25,5	17,8	4,1	78,2	0,7	45	0,1	6,3

Moisture content, calorific value and energy content of reed in year 2002/2003, monthly.

Nr	Plant	Date	Moisture, %	Calorific value, MJ/kg		Energy content, MWh/t	
				Q_a^{tarb}	Q_u^{tarb}	E_a^{tarb}	E_u^{tarb}
1	Reed	18.10.02	35.0	10.5	12.26	2.92	3.41
2	Reed	18.11.02	41.5	9.2	11.03	2.56	3.06
3	Reed	19.12.02	31.3	11.23	12.96	3.12	3.60
4	Reed	20.01.03	28.1	11.87	13.56	3.30	3.77
5	Reed	18.02.03	23.9	12.71	14.35	3.53	3.99
6	Reed	18.03.03	18.11	13.86	15.44	3.85	4.29
7	Reed	18.04.03	13.80	14.72	16.26	4.09	4.52

References

1. Kask, Ü., Kask, L.: Biomass Energetics Potential of Wetlands at Saare County. Investigation and Usage of Renewable Energy Sources. Third conference proceedings. Tartu, Estonia 2002.
2. Maddison M. Biomass ja selle kasutamine. Keskkonnatehnoloogia projekt. Tartu: 2003. 50 lk.

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REED SEMINAR, 21st – 22nd August 2003

Salo, Sininen Talo, Finland

These abstracts can be read in the internet pages of the Interreg IIIA project "Reed Strategy In Finland And Estonia" www.ruoko.fi