permanent grass covers the land used for grazing cattles (Brigitta Szabó)

Meadows and pastures (Hungary)

Rétek és legelők

DESCRIPTION

Permanent meadows or pastures are more effective in controlling land degradation than arable cropping. They are especially appropriate in hilly regions on sloping land where the risk of water erosion is high.

Permanent meadows and pastures are more effective in controlling land degradation than arable cropping. They are especially appropriate in hilly regions on sloping land where the risk of water erosion is high. This is a relevant technology also for valley floors where there is a regular inflow of water – resulting in sediment accumulation. Such grass cover has relevance also in plantations on sloping land.

There are some differences between pastures and meadows especially in their vegetation and land use. In general, meadows have a variety of natural growing plant species while pastures are often planted with specific types of grasses. Pastures are generally used for grazing animals while meadows are often mowed or harvested for hay (that is also often used for animal feed). Meadows may also be situated along streams or rivers on lowland areas, while pastures are typically situated on hilly regions.
Some of the most common grass species in Hungarian meadows are: meadow fescue (Festuca pratensis), smooth meadow-grass (Poa pratensis), and meadow foxtail (Alopecurus pratensis). Wildflowers (e.g Oxeye daisy, Field scabious) are also often growing on natural meadows in Hungary. On pastures the most common grass species are: ryegrass (Lolium perenne), tall fescue (Festuca arundinacea), and meadow fescue (Festuca pratensis). Hungarian pastures may also include legumes, such as red clover (Trifolium pratense) or white clover (Trifolium repens), which can help fix nitrogen in the soil and improve forage quality for grazing animals.

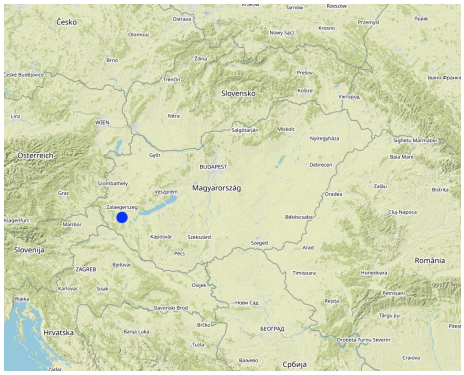
In the case of pastures farmers generally use a rotational grazing system, where the pasture is divided into sections and animals are periodically moved between them. Properly timed resting periods and regular rotation of pastures are essential for protecting the soil from erosion, promoting plant growth and nutrient uptake, and ensuring the long-term health and productivity of the pastures.

The main purpose of the technology (meadow and pasture land use) is to provide feed for livestock while reducing soil erosion and improving trafficability. The main conservation benefits are protection of the soil surface against transportation of particles by water or wind, thus avoiding soil loss and sedimentation. Due to lower velocity of surface runoff, more time is provided for infiltration of water into the soil, resulting in better water retention. In terms of production, meadows and pastures are predominantly used for providing hay or grazing land for ruminants. Different animals graze land differently, so the risk of soil degradation is lower in the case of cattle (which leave taller grass) and higher in case of sheep (which graze down to the soil surface), while in case of goats or pigs, the soil surface is easily damaged. In some special cases the main purpose of grass cover is simply soil conservation (very steep slopes, gully, etc.).

A significant proportion of grasslands (meadows and pastures) in Hungary are permanent, and they play an important role in agricultural production and the preservation of rural landscapes in the country. The common rules regarding the temporary or permanent use of agricultural land for this purposes (pasture or meadow) are contained in the Act CXXIX of 2007. The request for a land use change can be submitted at the local land offices. The most important requirement for land use change is that it must not result in a decrease in the total area of arable land below the minimum threshold set by the authorities and must not result in a decrease in the ecological value of the land. The conversion must be approved by the authorities and the appropriate land use permit must be obtained.

The application trend of this technology/solution is significantly depends on the situation of livestock production of a country. In Hungary, animal husbandry can be mentioned as the driving force of agriculture in the 1980s, with a share of 55-60% of its production value. However, by the end of the 1990s, this proportion had reversed and crop production had

LOCATION



Location: The case study area is situated within the Balaton Catchment Area in the western Hungary. The climate is moderately warm, moderately humid, the number of sunshine hours per year are high. Mean annual temperature of the region of the Lake Balaton is about 10 °C. The average amount of rainfall (600-700 mm / year) nationally means a medium rainfall zone. The Balaton Catchment area is 5765 km2. The main environmental purpose is to reduce pollutant (phosphorus and other plant nutrients) loads of Lake Balaton, where anthropogenic eutrophication is the main issue of environmental concern. Lake Balaton, with its nearly 600 sqkm area, is the largest shallow lake in Middle Europe. The lake as well as the surrounding area form very important natural (ecological, water and landscape) resources and are one of the major target areas of water related recreational tourism in Europe as a whole. 37% of the total catchment area is arable land which is much lower than the national average, 27% is forest, which exceeds the national average. 15% of the land suitable for grassland management, 5% is horticulture, 3% is pomiculture, 2% is viticulture, 1% is reed management and fish farming. The „Kis-Balaton" nature conservation area situated within the Balaton Catchment area. The „Kis-Balaton" wetland is under protection of the Ramsar Convention habitat., Zala County, Hungary

No. of Technology sites analysed: 2-10 sites

Geo-reference of selected sites

predominated. As there is no need for further pastures due to the decrease in livestock population, in recent times this type of land use change is not very common in Hungary.

- 16.84562, 46.67349

Spread of the Technology: applied at specific points/ concentrated on a small area

In a permanently protected area?: No

Date of implementation: 10-50 years ago

Type of introduction
- ☐ through land users' innovation
- ☐ as part of a traditional system (> 50 years)
- ☐ during experiments/ research
- ☐ through projects/ external interventions
- ☑ Upon the initiative of the land user

An example of meadow in the catchment area of Felső-Válicka (Brigitta Szabó)

Pasture in the Felső-Válicka catchment area (Brigitta Szabó)

CLASSIFICATION OF THE TECHNOLOGY

Main purpose
- ☐ improve production
- ☑ reduce, prevent, restore land degradation
- ☑ conserve ecosystem
- ☑ protect a watershed/ downstream areas – in combination with other Technologies
- ☐ preserve/ improve biodiversity
- ☑ reduce risk of disasters
- ☐ adapt to climate change/ extremes and its impacts
- ☑ mitigate climate change and its impacts
- ☐ create beneficial economic impact
- ☐ create beneficial social impact

Land use
Land use mixed within the same land unit: No

Cropland
- Annual cropping: cereals - barley, cereals - maize, cereals - wheat (winter), oilseed crops - sunflower, rapeseed, other

Number of growing seasons per year: 1
Is intercropping practiced? Yes
Is crop rotation practiced? Yes

Water supply
- ☑ rainfed
- ☐ mixed rainfed-irrigated
- ☐ full irrigation

Purpose related to land degradation
- ☑ prevent land degradation
- ☐ reduce land degradation
- ☑ restore/ rehabilitate severely degraded land
- ☐ adapt to land degradation
- ☐ not applicable

Degradation addressed

soil erosion by water - Wt: loss of topsoil/ surface erosion, Wg: gully erosion/ gullying

SLM group
- pastoralism and grazing land management

SLM measures

agronomic measures - A1: Vegetation/ soil cover

TECHNICAL DRAWING

Technical specifications

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated: per Technology area (size and area unit: **ha**)
- Currency used for cost calculation: **USD**
- Exchange rate (to USD): 1 USD = n.a
- Average wage cost of hired labour per day: 50

Most important factors affecting the costs

prices of input materials (fertilizers, pesticides, fuel)

Establishment activities

1. fertilization (Timing/ frequency: before primary tillage)
2. stubble tillage (Timing/ frequency: None)
3. weed control (Timing/ frequency: None)
4. primary tillage (Timing/ frequency: None)
5. secoundary tillage (Timing/ frequency: None)
6. seedbed preparation (Timing/ frequency: None)
7. sowing (Timing/ frequency: None)

Establishment inputs and costs (per ha)

Specify input	Unit	Quantity	Costs per Unit (USD)	Total costs per input (USD)	% of costs borne by land users
Equipment					
stubble tillage	ha	1.0	33.0	33.0	100.0
weed control	ha	1.0	15.0	15.0	100.0
fertilization	ha	1.0	15.0	15.0	100.0
primary tillage (ploughing 25-30 cm)	ha	1.0	72.0	72.0	100.0
secoundary tillage (harrow+packer)	ha	1.0	31.0	31.0	100.0
seedbed preparation	ha	1.0	20.0	20.0	100.0
sowing	ha	1.0	24.0	24.0	100.0
Plant material					
seed (55 kg/ha)	ha	1.0	262.0	262.0	100.0
Fertilizers and biocides					
fertilizers	ha	1.0	380.0	380.0	100.0
herbicide	ha	1.0	40.0	40.0	100.0
Total costs for establishment of the Technology				**892.0**	
Total costs for establishment of the Technology in USD				*892.0*	

Maintenance activities

n.a.

NATURAL ENVIRONMENT

Average annual rainfall

- ☐ < 250 mm
- ☐ 251-500 mm
- ☑ 501-750 mm
- ☐ 751-1,000 mm
- ☐ 1,001-1,500 mm
- ☐ 1,501-2,000 mm
- ☐ 2,001-3,000 mm
- ☐ 3,001-4,000 mm
- ☐ > 4,000 mm

Agro-climatic zone

- ☐ humid
- ☑ sub-humid
- ☐ semi-arid
- ☐ arid

Specifications on climate

distribution of rainfall is uneven

Slope

- ☐ flat (0-2%)
- ☑ gentle (3-5%)
- ☐ moderate (6-10%)
- ☐ rolling (11-15%)
- ☐ hilly (16-30%)
- ☐ steep (31-60%)
- ☐ very steep (>60%)

Landforms

- ☐ plateau/plains
- ☐ ridges
- ☐ mountain slopes
- ☐ hill slopes
- ☐ footslopes
- ☐ valley floors

Altitude

- ☐ 0-100 m a.s.l.
- ☐ 101-500 m a.s.l.
- ☐ 501-1,000 m a.s.l.
- ☐ 1,001-1,500 m a.s.l.
- ☐ 1,501-2,000 m a.s.l.
- ☐ 2,001-2,500 m a.s.l.
- ☐ 2,501-3,000 m a.s.l.
- ☐ 3,001-4,000 m a.s.l.
- ☐ > 4,000 m a.s.l.

Technology is applied in

- ☐ convex situations
- ☐ concave situations
- ☑ not relevant

Soil depth

- ☐ very shallow (0-20 cm)
- ☐ shallow (21-50 cm)
- ☑ moderately deep (51-80 cm)
- ☑ deep (81-120 cm)
- ☐ very deep (> 120 cm)

Soil texture (topsoil)

- ☐ coarse/ light (sandy)
- ☑ medium (loamy, silty)
- ☑ fine/ heavy (clay)

Soil texture (> 20 cm below surface)

- ☐ coarse/ light (sandy)
- ☑ medium (loamy, silty)
- ☑ fine/ heavy (clay)

Topsoil organic matter content

- ☐ high (>3%)
- ☑ medium (1-3%)
- ☐ low (<1%)

Groundwater table

- ☐ on surface
- ☐ < 5 m
- ☑ 5-50 m

Availability of surface water

- ☐ excess
- ☐ good
- ☑ medium

Water quality (untreated)

- ☐ good drinking water
- ☑ poor drinking water (treatment required)

Is salinity a problem?

- ☐ Yes
- ☑ No

- [ ] > 50 m

- [ ] poor/ none

- [ ] for agricultural use only (irrigation)
- [ ] unusable

Water quality refers to: surface water

Occurrence of flooding
- [ ] Yes
- [x] No

Species diversity
- [x] high
- [ ] medium
- [ ] low

Habitat diversity
- [x] high
- [ ] medium
- [ ] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [ ] subsistence (self-supply)
- [ ] mixed (subsistence/ commercial)
- [x] commercial/ market

Off-farm income
- [x] less than 10% of all income
- [ ] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth
- [ ] very poor
- [ ] poor
- [ ] average
- [x] rich
- [ ] very rich

Level of mechanization
- [ ] manual work
- [ ] animal traction
- [x] mechanized/ motorized

Sedentary or nomadic
- [x] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups
- [x] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

Gender
- [ ] women
- [x] men

Age
- [ ] children
- [ ] youth
- [x] middle-aged
- [ ] elderly

Area used per household
- [ ] < 0.5 ha
- [ ] 0.5-1 ha
- [ ] 1-2 ha
- [ ] 2-5 ha
- [ ] 5-15 ha
- [ ] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [x] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

Scale
- [ ] small-scale
- [ ] medium-scale
- [x] large-scale

Land ownership
- [ ] state
- [ ] company
- [ ] communal/ village
- [ ] group
- [ ] individual, not titled
- [x] individual, titled

Land use rights
- [ ] open access (unorganized)
- [ ] communal (organized)
- [x] leased
- [x] individual

Water use rights
- [ ] open access (unorganized)
- [x] communal (organized)
- [ ] leased
- [ ] individual

Access to services and infrastructure

health	poor ✓	good
education	poor	✓ good
technical assistance	poor	✓ good
employment (e.g. off-farm)	poor ✓	good
markets	poor	✓ good
energy	poor ✓	good
roads and transport	poor	✓ good
drinking water and sanitation	poor	✓ good
financial services	poor	✓ good

IMPACTS

Socio-economic impacts

Crop production	decreased ✓ increased	Later it may still be possible to continue with crop production on the area.
fodder production	decreased ✓ increased	Arable land use was turned into pasture
animal production	decreased ✓ increased	In this example beef cattle production was started as a new business
diversity of income sources	decreased ✓ increased	

Socio-cultural impacts

Ecological impacts

surface runoff	increased ✓ decreased	As soil surface is covered permanently in a meadow or pasture, surface runoff decreases significantly.
excess water drainage	reduced ✓ improved	
soil cover	reduced ✓ improved	The most important benefit of meadows and pastures is

that soil is covered permanently, that helps in the prevention of soil loss by erosion.

soil loss: increased — decreased
soil crusting/ sealing: increased — reduced
soil organic matter/ below ground C: decreased — increased

Using mowed grass as mulch can increase the carbon content of the soil.

vegetation cover: decreased — increased

There are more plant species present simultaneously in meadows and pastures than in cultivated fields, which is beneficial for soil health

animal diversity: decreased — increased

Especially naturally managed meadows attract wildlife and therefore increase biodiversity

habitat diversity: decreased — increased

Off-site impacts

buffering/ filtering capacity (by soil, vegetation, wetlands): reduced — improved

Water retention is better

wind transported sediments: increased — reduced

As the grass binds the soil particles, the wind cannot pick them up and carry them away even during dry periods.

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns: very negative — very positive
Long-term returns: very negative — very positive

Benefits compared with maintenance costs

Short-term returns: very negative — very positive
Long-term returns: very negative — very positive

CLIMATE CHANGE

Gradual climate change

seasonal temperature increase: not well at all — very well — Season: summer
seasonal rainfall decrease: not well at all — very well — Season: summer

Climate-related extremes (disasters)

drought: not well at all — very well

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- [ ] single cases/ experimental
- [x] 1-10%
- [ ] 11-50%
- [ ] > 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- [ ] 0-10%
- [ ] 11-50%
- [x] 51-90%
- [ ] 91-100%

Has the Technology been modified recently to adapt to changing conditions?

- [ ] Yes
- [x] No

To which changing conditions?

- [ ] climatic change/ extremes
- [ ] changing markets
- [ ] labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

- Permanent soil cover
- Continuous income

Strengths: compiler's or other key resource person's view

- Provide better habitat conditions
- Ecological advantages

Weaknesses/ disadvantages/ risks: land user's viewhow to overcome

- Not enough hay/grass in drought seasons locally grown fodder should be supplemented by external sources
- Income is less than in crop production

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome

REFERENCES

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Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_6195/

Linked SLM data
Approaches: Sustainable livestock and pasture management https://qcat.wocat.net/en/wocat/approaches/view/approaches_3713/

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Key references
- The grassland care handbook: Einböck (einboeck.eu), info@einboeck.at
- Verba&Kőszegi: The situation of livestock production, its prospects through the examples of a farm in Bács-Kiskun County. Gradus Vol 9, No 1 (2022) ISSN 2064-8014: https://gradus.kefo.hu/archive/2022-1/2022_1_AGR_003_Verba.pdf

Links to relevant information which is available online
- How to manage a meadow for hay making and grazing pasture: http://www.magnificentmeadows.org.uk/assets/pdfs/Hay_meadow_and_pasture_management.pdf