NATURE AND LANDSCAPE MANAGEMENT STANDARDS

MANAGEMENT OF SELECTED TERRESTRIAL BIOTOPES	**MOWING OF GRASSLANDS**	**SPPK D 02 004: 2017**
SERIES D		

Grünland mähen

This standard contains definitions of technical and technological procedures of grassland and reed mowing management.

References:

Act No 89/2012 Coll., the Civil Code, as amended.
Act No. 114/1992 Coll., on nature and landscape protection, as amended.
Act No. 185/2002 Coll., on waste and on change of some other acts, as amended
Act No. 254/2001 Coll., on water and on amendments to certain acts (the Water Act), as amended.
Government Decree No. 75/2015 Coll., on the rules for implementation of Agri-Environment-Climate Measures and on the amendment of Government Decree No. 79/2007 Coll., on conditions for implementation of Agri-Environment Measures, as amended.
Government Decree No. 76/2015 Coll., on the Rules for the implementation of measures for organic farming, as amended.
Decree 387/2016 Coll., amending Decree No. 294/2005 Coll., On the conditions of landfilling of waste and its use on the surface of land and amending Decree No. 383/2001 Coll., On waste management details, as amended, and the Decree No 383/2001 Coll., on details of waste management, as amended.
Decree No. 341/2008 Coll., on details of the management of biodegradable waste and amending Decree No. 294/2005 Coll., on the conditions of landfilling of waste and its use on the surface and amending Decree No. 383/2001 Coll., on waste management details (Decree on details handling of biodegradable waste).
Decree No. 383/2001 Coll., on details of waste management, as amended.
Decree No. 395/1992 Coll., which implements some provisions of the Czech National Council Act No. 114/1992 Coll., on nature and landscape protection, as amended.

Standard development:
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Documentation for standard development is available in the library of NCA CR.

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1. Purpose and content of the standard

The standard „Mowing of grasslands“ defines mechanical instruments and the technique of operations realised in grassland communities and reeds to restore or maintain semi-natural ecosystems, habitats for plants and animals and maintenance or improvement of their species diversity.

The standard is designated namely to applicants for support from landscape management programmes, also for suppliers, civil servants and municipalities, non-governmental organisations, farmers, land owners and tenants. It refers to the grassland and reed harvest in specially protected areas and valuable habitats. It does not refer primarily to the harvest of fodder for the animal production.

In our region permanent grasslands represent mostly secondary, semi-natural habitats, which were created by human activity. Their existence therefore depends on human management. In case grasslands are not managed (by mowing or grazing) changes of the species composition of the grass stand occur at first, later the grassland gradually becomes overgrown with woody plants. Mowing of grasslands is important not only for maintenance or improvement of their botanical structure, but also for maintenance of the landscape character. Methods and date of mowing affect not only plant diversity, but also animals living in grasslands (invertebrates and vertebrates).

Legislative Framework

Act No. 114/1992 Coll., on nature and landscape protection, as amended - inter alia, defines the basic concepts, including, for example, important landscape element, defines basic duties in general nature conservation - general plant and animal protection and wild bird protection. Further it deals with protection of protected species of plants and animals and nature protected areas. Last, but not least, it governs protection of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

Act No. 185/2002 Coll., on waste and on change of some other acts, as amended – inter alia it defines, when something, including e.g. grass biomass, converts onto a waste and further deals with the topic of liquidation and processing of biologically degradable waste, what includes according to the **Decree No. 341/2008 Coll.**, on details of processing of biologically degradable waste grass biomass in case when it is not used as fodder for cattle.

Act No 254/2001 Coll., on water and on change of some other acts, as amended – inter alia regulates rules for protection of surface and underground water so, that when composting and unloading grass biomass the environment and the water quality cannot be threatened by it.

Act No 89/2012 Coll., the Civil Code – regulates the handling of grass matter in the sense that the owner of the thing is forbidden beyond reasonable proportions to seriously interfere with the rights of others. Furthermore, the owner must refrain from everything, smoke (type of

immission) for example, that causes restriction of the usual use of the land of another owner to a degree unreasonable to local circumstances.

2. Mechanization used for mowing of grasslands

2.1 Hand carried, controlled mechanization

2.1.1 **Scythe**

2.1.1.1 Scythe is used for mowing small, poorly accessible or waterlogged areas or areas with occurrence of important species of invertebrates or dicotyledonous plants.

2.1.1.2 Using a scythe is recommended in localities with relatively flat land surface and without a higher proportion of established trees.

2.1.2 **Strimmer**

2.1.2 According to the cutting device:

- strimmer with metal brush cutting head
- strimmer with string head (knife, disc)

2.1.2.2 It is used in steep, strongly waterlogged areas, or areas with a ragged micro-relief.

2.1.2.3 In localities with high proportion of dicotyledonous plants we recommend mowing with a strimmer with string head (smooth cutting without fraying helps plants to regrow better) and to maintain it sharp.

2.1.3 **One axle hand controlled mower**

2.1.3.1 According to the cutting device:

- rotary mower
- sickle bar mower

2.1.3.2 It is used for mowing large areas with relatively flat land surface, not significantly wet.

2.1.3.3 In localities with high proportion of dicotyledonous plants we recommend mowing with a sickle bar mower (smooth cutting without fraying helps plants to regrow better) and to maintain it sharp.

2.2 Mobile mechanization

2.2.1 **Mowing by light mechanization**

2.2.1.1 Tractor mowers with the total weight of up to 3 500 kg with low pressure tires and suitable mowers (see point 2.3)

2.2.1.2 Self-propelled mowers with the total weight of up to 3 500 kg with low pressure tires and suitable mowers (see point 2.3)

2.2.1.3 Light mechanization is used for mowing of steep areas, small and broken land parcels, which are accessible for this mechanization.

2.2.2 **Mowing by heavy mechanization**

2.2.2.1 Mowing is done with using of mowers with a total weight from 3 500 kg.

2.2.2.2 Mowing of grasslands of with using large-scale mechanization is possible in large, flat land parcels with regular shape (using is limited by hillside availability up to 12°).

2.3 Dividing of mowers according to razor edge working

2.3.1 **Finger bar mowers and sickle bar mower**

2.3.1.1 Movement of the blade is rectilinear reverse, cut is smooth without fraying.

2.3.1.2 Smooth cutting without fraying and slower movement of the machines on the land allowing the escape of animals is the advantage. It is recommended for the localities with high proportion of dicotyledonous plants (it allows better regrowth) and with high total biodiversity.

2.3.1.3 Work performance with a smaller shot (to use in smaller areas) is the disadvantage, unreliability when mowing wet and tilted stands and demanding requirements of maintenance (grinding and changing blades).

2.3.2 **Rotary drum mowers, rotary disc mowers and mulch-laying machines**

2.3.2.1 Movement of a blade is rotational, quality of cutting is less (in particular when blades are blunt) than the type of mechanization described in the point 2.3.1. Cutting wounds on stubble are large and often frayed.

2.3.2.2 Lower quality of cutting leads to slow regrowth, weakening of plants (it is necessary to put more reserve substances for creation of the callus), increasing of the risk of an infection of fungi pathogens. A change of species composition can occur. Legumes are especially sensitive; some species are in opposite supported by this (e.g. *Pedicularis sylvatica* and *Pedicularis palustris*).

2.3.2.3 Using this type of mechanization leads to increased invertebrate mortality.

2.3.2.4 Using of mechanization with rotational movement of blades is suitable in the localities, where it is needed to disturb the soil surface and to help to competitively weak species. In opposite we do not recommend using it in localities which are valuable due to insects. However, it is also necessary to consider real possibility of the contractor.

2.3.2.5 Using a mulch-laying machine is stated in the point 4.3.2.

3. Mowing procedure

3.1 Principles of correct mowing and harvest of grass mass

3.1.1 Selection of mechanization shall be adapted to the weather conditions and soil humidity in the locality to prevent abnormal disturbance of the grass turf.

3.1.2 When grassland is mown and harvested in the near-field soil moisture capacity, some damage of the grass turf can happen (runways, soil compaction, removal of grass turf, grass covered by soil).

Possibilities how to protect grass turf against damage:

- Moving the deadline until the risk of land degradation decreases (soil will dry out)
- Using mechanization with wide or low pressure wheels with high safe-load
- Using manually leaded mechanization or manual tools with low weight (see the point 2.1).

3.1.3 In case of inaccessible areas or long-term rainy weather, a suitable type of mowing and pulling of the grass will be selected from available technologies.

3.1.4 All important aspects – the subject of protection (habitat, plant or animal species) and its needs for restoration, maintenance or improvement, and accessibility, sloping and other conditions of the locality should be considered when selecting mechanization, way of mowing and harvesting of grass mass. It is also necessary to consider the real capacity and equipment of the contractor.

3.1.5 Heavy mechanization (see point 2.2.2) must not be used in conditions of high humidity, when there is danger of damaging the soil surface - the turf (runways, soil compaction, and difficult harvest in following dates).

3.1.6 High work performance in machine mowing (i.e. does not involve hand controlled and carrier-mounted machinery) reduces possibility of escaping for animals from the mown stands. Mowing shall be done from one edge of the parcel to the other (see Figure 4) or from the centre to edges (see Figure 5) in the land parcels, where it is possible due to its area and shape. The reason is allowing possibility for escaping to game and other animals, which are pushed to the edges in order to escape.

3.1.7 Mechanization with suitable cutting head is used (see point 2.3).

3.1.8 Decreased load capacity of the soil surface in waterlogged parcels does not allow using of standard mechanization, and mowed biomass (ideally dry or at least withered) must be harvested manually (using tarpaulins) or using light mechanization with low pressure.

3.1.9 It is necessary to use special mechanization with lowered centre of gravity (because of risk of turning over) or to harvest biomass manually at the slopes with declination more than 12°.

3.1.10 Mowing height:

- Optimal mowing height is 5 – 10 cm above soil surface (lower height of cut damages the turf, regrowth is retarded and also there is threat of delay of drying and contamination of the fodder by soil and damaging the mowing machines by stones).
- In localities valuable due to occurrence of rare mosses (e.g. peat bogs, marshlands) the optimal mowing height is 3 – 5 cm. Due to the moss and peat layer there is no danger of damaging mechanization by stones and also contamination of mass with soil does not mind (the mass is not usually needed for fodder).
- Grass stand should reach a height of at least 15 cm before mowing (vegetative parts of plants).

3.1.11 Date of mowing

- Mowing of grass mass is done in principal for maintenance or improvement of favourable ecological conditions for target species and habitats. Quality of produced grass mass/hay is secondary. Date of mowing is a key factor for the result of management and it should be chosen taking into consideration the needs of target species or habitats, so that abundance of their populations are maintained or strengthened (to allow the completion of the flowering and propagation of offspring). Date and frequency of mowing can be planned also to reduce undesirable species (namely those with generative reproduction).
- As the needs of desirable species related to grassland communities are various and sometimes opposing, we recommend paying attention to diversification of dates of mowing between years (e.g. early first cut once in two or three years can support spring ephemeras). Time and spatial heterogeneity has a positive influence on diversity in common.

3.2 Frequency of mowing

3.2.1 Number of cuttings during a vegetation season depends on ecological conditions in the concrete locality, especially considering water availability, content of nutrients in soil and altitude. Frequency of mowing is also influenced by the speed of regrowth in a certain year (depending on temperature and amount of precipitation in weeks before mowing). Further important factor influencing number of cuts is occurrence of endangered species of plants and animals.

3.2.1.1 Grasslands can be divided to:

- Occasionally mown – once in two or three years – in specific conditions or at specific communities (e.g. in considerable drought, oligotrophic communities) it is possible to skip mowing without a negative influence on the species structure of the stands.

- Mown once a year – mountain one-cut meadows, oligotrophic and xerothermic meadow communities, possibly also in other communities when the weather is extreme.
- Mown twice a year – grasslands in nutrient rich soils (in wet years the grasslands can be mown three times a year).
- Mown more times than twice a year – grass stands or their parts with occurrence of invasive/expansive plant species which should be eliminated.

3.3. Types of mowing

3.3.1 **Flat mowing**

3.3.1.1 Grassland is mown in the whole parcel in one moment.

3.3.1.2 Rules for technique of mowing must be fulfilled in the whole parcel (see point 3.3.5).

3.3.1.3 This type of mowing can be recommended only occasionally, e.g. in case of liquidation of invasive or expansive plant species or in small parcels and other grasslands in close neighbourhood. For grasslands with higher botanical or zoological importance we recommend following types of mowing.

3.3.2 **Leaving unmown parts**

3.3.2.1 One or more places will be left unmown in a grass stand.

3.3.2.2 The shape, size, number and placement of unmown places shall be drawn into an aerial photograph of the site (as annex to the contract), possibly marked in the field with visibly placed pegs.

3.3.2.4 Size of unmown patches:

- Small isolated enclaves up to 1 ha – at least 20 % of total area, if the locality is in good condition and the vegetation is stable.
- Other localities – at least 10 % of total area.

3.3.2.5 Placement of the unmown patches should be changed during years to prevent leaving out some place without mowing more than one year and prevent accumulation of dead biomass, and possible spreading of woody plants.

3.3.2.6 Unmown patches should not be left in the parts of a stand, where undesirable expansive or invasive plant species occur, such as:

Calamagrostis epigejos, *Heracleum mantegazzianum*, *Lupinus polyphyllus*, *Rumex alpinus*, *Rumex obtusifolius*, *Rumex crispus*, *Rumex longifolius*.

3.3.3 **Mosaic mowing**

3.3.3.1 It should be done in localities mown manually with a scythe or a strimmer or using a hand controlled mower, namely in species rich grasslands, which are in good condition and in grasslands with rugged patches where diversity of invertebrates is high.

3.3.3.2 This management is not necessary during restoration procedure or when mowing ruderal or degraded places.

3.3.3.3 Proportions of unmown plots shall be similar to unmown patches (see point 3.3.2.4).

3.3.3.4 Smaller plots shall be left unmown in places with stable vegetation, flowering patches, without occurrence of invasive or undesirable species.

3.3.3.5 Size of the mosaic depends on heterogeneity of the environment:

- Unmown places about size of some dozens of m^2 will be left in areas with homogenous vegetation (if they are not mown in stripes).
- It is necessary to decrease size of the mosaic and to leave some places about size of several m^2 (not less than 4 x 4 m, as prevention of drying up of the places and dying of caterpillars before finishing their development) in rugged patches and patches with varied vegetation structure.

3.3.3.6 Mosaic mowing shall be realised in such a way, that places mown early or later alternate during years.

3.3.4 **Gradual mowing**

3.3.4.1 Grassland is mown step by step, in different time periods (3 weeks long at least). The number of plots and dates of mowing are stated in the contract/agreement and the annex must contain an aerial photo of the locality with marked unmown places marked out.

3.3.4.2 Gradual mowing should be realised in larger parcels and using mobile mechanization.

3.3.4.3 Gradual mowing shall be realised in such a way, that places mown early or later alternate during years.

4. Treating grass mass

4.1 Utilization of grass mass

4.1.1 **Hay making**

4.1.1.1.Mown fodder remains in the parcel one day or several days for decreasing the water content from former 75 – 85 % to 40 – 15 %, when harvested in a traditional way.

4.1.1.2 The traditional way of grass harvest is used because of maintenance, and possibly increasing in species richness of the stand due to falling out seeds of different maturity on the soil surface during turning over and harvest of the fodder in valuable grasslands.

4.1.1.3 In case the grass stand includes expansive or invasive plant species the date of harvest should be postponed to the period before their flowering to prevent development of ripe seeds (invasive plants see the standard SPPKD 02 007:2015).

4.1.2 **Utilization of green or partly dried grass mass**

4.1.2.1 Grass mass is removed after mowing before drying totally (e.g. for making silage from partly dried fodder).

4.1.2.2 It is recommended to leave mown grass mass at least one day after mowing in the place. It allows invertebrates to escape before harvesting. If the grass mass is used for feeding fresh, it shall not be cut by a chaff-cutter (it causes liquidation of invertebrates and small animals, e.g. reptiles).

4.1.2.3 Grass mass or hay, must be removed till 2 weeks after mowing of the grass mass, otherwise covered plants die.

4.2 Collecting and removing of grass mass

4.2.1 **Raking grass mass**

4.2.1.1 The grass mass shall be raked with a rake in the localities, where it is impossible to use mechanization (slope, stony, waterlogged) and also in the localities with occurrence of important species of invertebrates (namely ants living in above surface nests).

4.2.1.2 Mechanization shall be used in large areas and in places, where it is recommended to support turf disturbance and depress moss layer, e.g. localities with occurrence of *Gentianella* species (smaller areas sensitive to soil compression shall be managed by turning and collecting tools to hand leaded mower, in other areas tractor-mounted forage tedders and rakers can be used). This technique is more effective and causes moss and dead biomass removal.

4.2.2 **Harvesting grass mass**

4.2.2.1 Grass mass shall be picked up manually with a pitchfork in localities, where it is impossible to use mechanization (slope, stony, water-loaded) and also in localities sensitive to loading.

4.2.2.2 In other areas it is possible to use mechanization connected to a tractor for harvest (press, harvesting machine).

4.2.2.3 Grass mass shall be loaded in a car or on blanket according to the concrete locality (usually on a slope, in waterlogged or inaccessible areas).

4.2.3 **Gathering grass mass**

4.2.2.1 Route for gathering grass mass will be stated according to conditions in the concrete locality (always on the same route or different routes to prevent concentrated damage to the turf). It is recommended especially in case of waterlogged meadows.

4.3. Disposal of grass mass

4.3.1 In case grass mass cannot be used as fodder for animals (hay, green fodder), it is necessary to proceed to alternative utilization or disposal of grass mass:

1. With removal of grass mass from the locality and following disposal:

    a. in a biogas station

    b. in a waste dump

    c. in an incinerator

    d. in a composting plant

2. With a disposal of grass mass in the locality

4.3.1.1 Treatment of the mown grass mass which is not destined for feeding, energetic purpose or composting must be managed according to the Law No 185/2001 Coll., on waste, as amended (namely Degree No 341/2008 Coll., on details of processing of biologically degradable waste grass biomass).

4.3.1.2 Disposal of grass mass in the locality must not cause degradation of the habitat or needless endangering of animals (in case disposal is delayed after harvesting, the stack must be handled or disposed of manually in parts, especially during the period when the reptiles and amphibians are already active).

4.3.2 **Mulching**

4.3.2.1 During mulching aboveground biomass is separated from a stubble field and at the same time it is cut and spread over the land surface. Grass mass is not harvested and is left for

decomposition in the place (also in case when it is harvested, a great amount of mass remains in the locality).

4.3.2.2 This technique can be used only occasionally, in special cases for the first grass biomass removal in abandoned grasslands overgrown with woody plants, in starting phases of succession, as restoration management, and further for disposal of ungrazed parts in pastures, which are formed by unpalatable species. **The intervention should be one-time and it will not be repeated again** (in the case when the condition of the locality requires it, the intervention can be repeated during the season). The intervention shall take place in parts.

4.3.2.3 Mulching of old, high stands results in accumulation of a thick layer of hard degradable grass biomass, which will not be decomposed till winter due to low temperature and high ratio of C:N. It prevents emergence of seedlings, makes more difficult the regrowth of plants and contaminates the fodder with fungi in spring.

4.3.2.4 Mulching decimates populations of insects, especially non-volatile stages. In valuable localities mulching should be used only occasionally or not at all.

Annex No. 1 Illustrations

Fig. 1 Mowing with unmown stripes left (see the chapter 3.3.2)

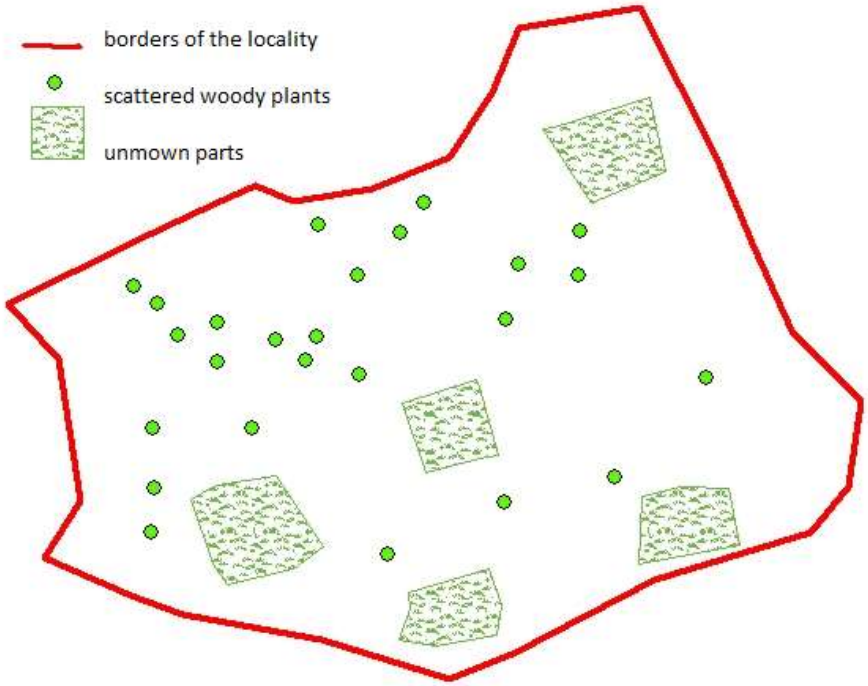

Fig. 2 Mowing with a mosaic left (see the point 3.3.3.5)

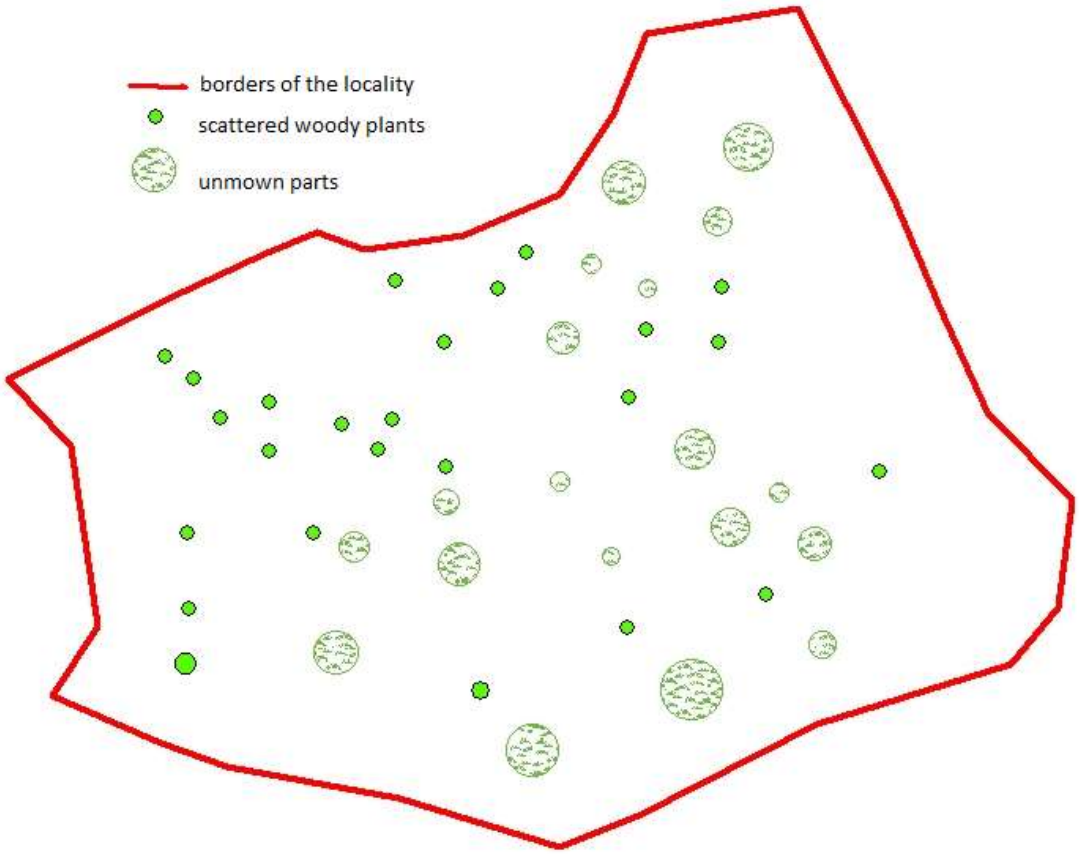

Fig. 3 Mowing with a detailed mosaic left (see the point 3.3.3.5)

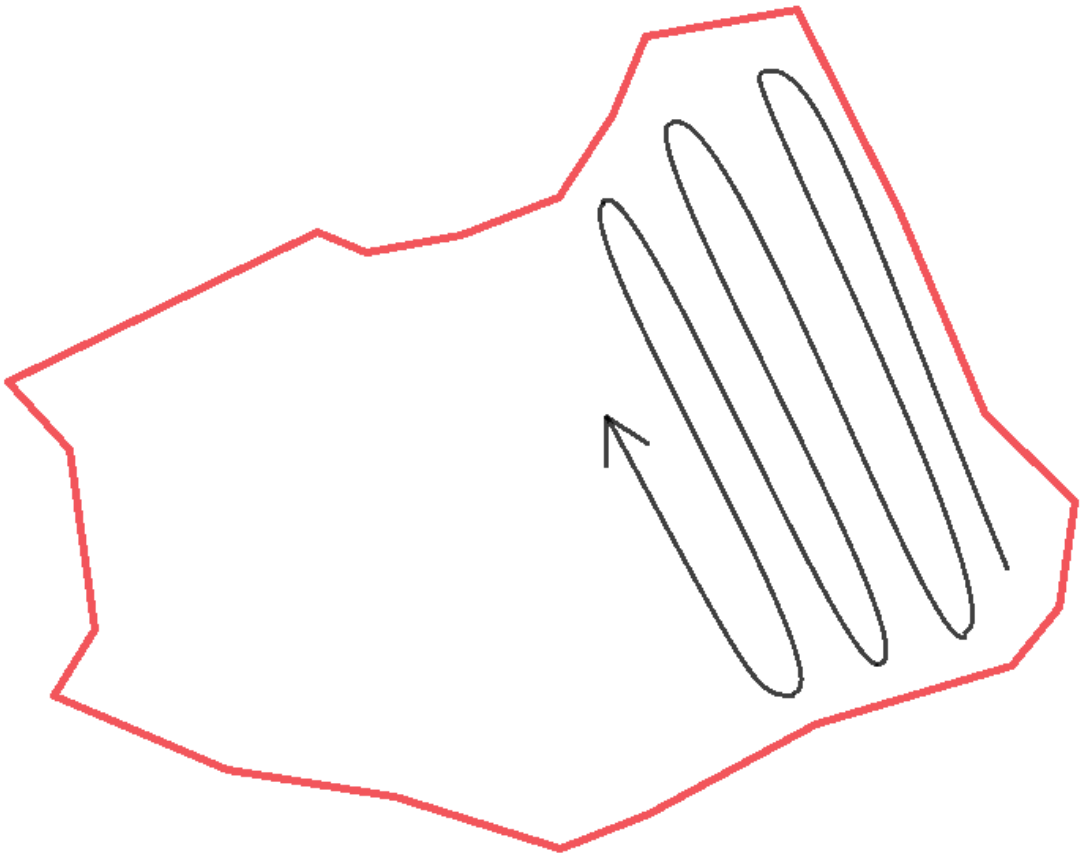

Fig. 4 Mowing from one edge to the other (See the point 3.1.6)

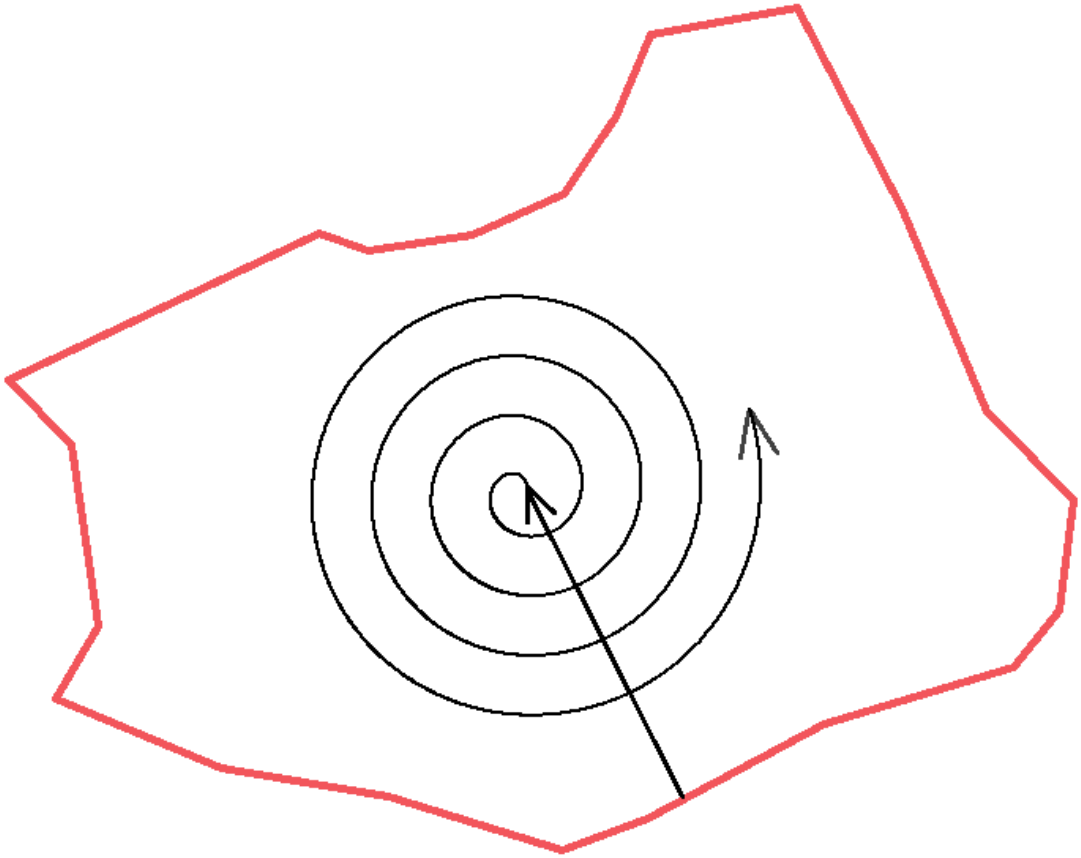

Fig. 5 Mowing from the centre to edges (see the point 3.1.6)

Annex No. 2 The list of processed Standards of nature and landscape management (Management of selected terrestrial biotopes)

00 General

00 001 Terminology

01 Controls, evaluation, planning

02 Technological procedures

02 001 Restoration of grassland communities by using regional seed mixtures

02 002 Restoration of long-term unmanaged grassland communities (including removal of natural seeding woods)

02 003 Management of grassland – Grazing

02 004 Management of grassland – Mowing

02 005 Disturbing management on non-forest areas

02 006 Measures to improve species composition of forest stands

02 007 Removal of selected invasive plant species

02 008 Removal of selected invasive animal species

03 Occupational safety and health protection

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