

Annex 3. Control of expansive and invasive plant species (S. Rūsiņa)

Definition of expansive and invasive species and their eradication methods are given in Chapter 21.9. Pasture weed problems are highlighted in Chapters 22.3.1 and 22.3.5. Photo: A. Priede (shrub species, *Bunias orientalis*, *Impatiens glandulifera*, *Rubus caesius*, *Phragmites australis*) S. Rūsiņa (other species).



Sorbaria sorbifolia, *Robinia pseudoacacia* and *Cytisus scoparius* can also be invasive in grasslands.

Distribution in grasslands: grow well in dry soils of varying acidity, propagate vegetatively and create dense scrub.

Control: species that are very difficult to control. Shrubs must be cut several times every year and even then regrowth will occur. Root extraction is more effective, however, it must be repeated several times in combination with the mowing of shoots or covering of stumps with black dense film, which is left for at least 1–2 years. The application of herbicides is effective, however, they should not be used if the risk of water pollution exists or particularly sensitive species occur in the area. It is recommended to inject them into the stem (Kabuce, Priede 2010; Gudžinskas et al. 2014).

Bunias orientalis



Distribution in grasslands: grows well on road verges, in ruderal habitats, ex-arable lands and gardens. It gets introduced especially in grasslands that have been abandoned, as well as in floodplain grasslands. Most commonly occurs in light, relatively fertile soils with a neutral reaction. Individual plants can reach 12 years of age. It spreads well by seeds, which retain their germination capacity for a long time, as well as by fragments of roots.

Control: control measures must be performed before seed maturation. Mowing must be performed at least twice during the summer – the plant must be mown as soon as the first flowers appear. This will reduce the abundance of species in the grassland very slowly, but it will limit the further spread of the species by seed. Hand-pulling or digging up is only efficient if the entire root system is removed, because the plant spreads well by means of root fragments. Grazing is not effective because pasture animals avoid eating it (Birnbaum 2006).

Echinocystis lobata



Distribution in grasslands: common on the banks of large rivers, and in floodplain grasslands. After the germination of seed the plant quickly produces highly branched, vine-like stems, the broad leaves block the light and other plant species die.

Control: the plant is annual, therefore its control is rather simple, since it does not regrow after mowing. Control: mowing and removal of green mass at the beginning of the blooming period, while the seeds have not ripened yet. In small areas hand-pulling of plants as soon as they appear is the most effective method. The area must be monitored for the presence of flowering specimens that could disperse seeds.

Impatiens glandulifera



Distribution in grasslands: a tall (2–3 m) annual plant, which is spread predominantly by seeds. When mature and dry, the fruits split open explosively if touched, flinging the seeds a considerable distance from the parent plant. However, it can also reproduce vegetatively – the stems can be rooted at the nodes and even a stem fragment may be sufficient to develop a new plant. Spreads predominantly through river valleys, along river banks and invades moist, fertile floodplain grasslands and eutrophic tall herb stands.

Control: mowing must be performed very low and the mown material must be completely collected and destroyed. Mowing or grazing must be performed at the time when the first flowers appear and continued for 2–3 consecutive years, because the plant regrows from seeds, which retain their germination capacity for several years. (Helmisaari 2010).

Heracleum sosnowskyi

Distribution in grasslands: a biennial or perennial plant, which dies after flowering. If the plant is not allowed to flower, a perennial form develops. The plant spreads in different grassland habitats, particularly actively in ex-arable lands and previously cultivated grasslands, where the turf has not closed and therefore the plant is more successful in competition with grassland plant species.

Control: further spread of the plant is controlled by frequent mowing to prevent seed ripening (3-4 times per season), which must be repeated for several years. Cutting of inflorescence can also be carried out, because the main objective is to prevent seeds from spreading. However, elimination of the species by these methods alone is not possible. In small areas the plants can be dug out or dug out to a depth of at least 10–15 cm below the ground and the removed roots must be destroyed (dried roots must be burnt, composted, etc.), otherwise they will regrow. The best time to do it is April and May, when the soil is loose, however, it must be repeated in summer to destroy regrown or unnoticed plants. Control by sheep grazing is effective, if it is started in early spring, when the plants are still small. Herbicides can also be applied. If *Heracleum sosnowskyi* has invaded a fertile grassland and the development of a semi-natural grassland is planned after the elimination of *Heracleum sosnowskyi*, deep ploughing (at least 40-50 cm deep) in autumn is the most effective method. The frost will destroy the roots and deep ploughing will prepare the ground for semi-natural grassland species both by reducing the seed bank of fertile soil competitive species and nutrient removal. For more detail on the control of *Heracleum sosnowskyi* see the internet website of the State Plant Protection Service <http://www.vaad.gov.lv/sakums/informacija-sabiedribai/par-latviju-bez-latvaniem.aspx> and the Internet web site of AS Latvijas Valsts Meži (Latvian State Forests JSC): http://www.lvm.lv/images/lvm/Petijumi_un_publicācijas/Petijumi/Gala_zinojums_Latvanis_2013.pdf.

Lupinus polyphyllus

Distribution in grasslands: biennial or perennial herbaceous plant that spreads by seeds. Vegetative reproduction of the plant (through rhizomes) is weak. Commonly occurs on road verges and in old ex-arable lands or abandoned cultivated grasslands in mesic areas. Symbiosis with root nodule bacteria attracts nitrogen and therefore the soil becomes more fertile and less suitable for wild species.

Control: mowing at least twice per season before the ripening of seeds (mowing must be performed, when the first flowers appear), continued for 3–5 years. In small areas the plants can be pulled out and destroyed completely, to prevent seed maturation. After being pulling out, the plants do not usually regrow (Valtonen et al. 2006; Fremstad 2010).

Oenothera spp.

Distribution in grasslands: biennial plant (dies off after flowering) that invades dry grasslands with sparse vegetation. Most abundant in dry ex-arable lands, where the sward is not closed and therefore vegetation is less competitive. The species has a wide leaf rosette, which covers the soil and suppresses other species. In the absence of water and nutrients the plant can survive in the form of a rosette for several years. The plant spreads by seed, one plant can produce 25,000 seeds. Seeds may even keep their germination ability for as long as 80 years (Mihulka et al. 2006).

Control: effective control of the plant is achieved by regular mowing without allowing the plants to bloom and spread seeds. The plant does not reproduce vegetatively. The species of this genus have an abundant seed bank, therefore mowing will be necessary for several years (Hall et al. 1988).

Rumex confertus

Distribution in grasslands: biennial or perennial plant, which mainly gets introduced in dry and mesic grasslands that have been cultivated earlier or in old ex-arable lands. One plant produces up to 4,000 seeds, which are easily spread by wind and birds, also in floodplains with flood water. Seeds retain germination capacity for several years (Kolodziejek, Patykowski 2015).

Control: mowing at least twice during the vegetation season before seed ripening (as soon as the first flowers appear). Individual plants can be dug out and roots must be destroyed. Grazing is inefficient, because pasture animals avoid eating the plant (Gudžinskis 2014). If *Rumex confertus* has taken over the entire grassland, only ploughing and agrotechnical measures are efficient, in combination with herbicide use, if it is acceptable from an environmental point of view. If *Rumex confertus* has invaded a fertile grassland and the establishment of semi-natural grassland is planned, deep ploughing (at least 40–50 cm deep) in autumn is the most effective method. The frost will help destroy the roots and deep ploughing will prepare the ground for semi-natural grassland species both by reducing the seed bank of *Rumex confertus* and other competitive species and nutrient removal. Deep ploughing in floodplains should be carried out in spring.

Solidago canadensis and *S. gigantea*

Distribution in grasslands: spreads both by root fragments and seeds, which are wind-dispersed (pappi). The plant invades dry and, less often, mesic grasslands, creating dense monodominant stands. Most commonly the plant invades old ex-arable lands and abandoned cultivated grasslands rather than semi-natural grasslands. Very deep root system (up to 3 m).

Control: mowing several times a year before flowering, which must be repeated for several consecutive years. Covering with thick, black film for the entire vegetation season is effective in small areas. Grazing animals unwillingly eat the plants and the species may spread excessively in pastures.

Expansive species

Anthriscus sylvestris, *Aegopodium podagraria*, *Chaerophyllum aromaticum**Anthriscus sylvestris*

Perennial species with a long (up to 2 m) taproot, blooms in the 2nd–4th year of life. The plant dies after flowering. Reproduces by seed and vegetatively – lateral sockets develop in the rosette. Does not develop a persistent seed bank – seeds retain germination capacity for one year.

Aegopodium podagraria

Perennial plant that spreads well vegetatively by rhizomes, which can grow to a length of 1 metre per year. Does not create a persistent seed bank.

Chaerophyllum aromaticum

Perennial species that reproduces vegetatively by means of rhizomes. Does not create a persistent seed bank. (Unlike *Aegopodium podagraria*, which has bare shoots and leaves, the leaves and shoots of chervil are covered with coarse, bristle-like hair).

Distribution in grasslands: all three species are nitrophytes therefore they spread in fertile soils. Abandonment of grasslands, as well as mowing grass and leaving it on site enriches the soil with nitrogen and the species start dominating, displacing almost all other species. Since the late 20th century the distribution of these species has been constantly increasing. They invade both dry and mesic and even wet grasslands, where eutrophication occurs.

Control: *Anthriscus sylvestris* is controlled by grazing or mowing twice per season. Mow for the first time at the beginning of blooming (late May). This promotes repeated flowering and reduces the vegetative reproduction. The time of first mowing should not be delayed. If the first mowing is performed when the plant is in full bloom, repeated flowering does not occur, but vegetative reproduction with lateral rosettes is facilitated. The second mowing is performed at the beginning of the repeated flowering. The mown plants must always be removed. Good results are achieved by mowing 4–6 times per season for 3–4 years. Intensive grazing in early spring is also efficient (Van Mierlo, Groendael 1991; Darbyshire et al. 1999). Good results have been achieved by sheep grazing in early spring (late April), because this is one of the first plants to sprout in spring and sheep readily eat it. In summer the grassland is mown and the grass removed before the flowering of *Anthriscus sylvestris* (G. Kleinbergs, personal comm.). In Slampe and Dundurplavas meadows continuous stocking with a grazing pressure of 0.75 LU ha⁻¹ reduced the cover of *Anthriscus sylvestris* from 40% to 5% within five years (Fig. 21.5.19, Priede et al. 2015).

Aegopodium podagraria and *Chaerophyllum aromaticum* are very difficult to eradicate, if they already dominate the sward. Frequent mowing can control the further spread of these species, but it cannot eliminate them. The grass must be removed after mowing every time, otherwise the abundance of *Aegopodium podagraria* will not be reduced, as nutrient removal does not occur (Gaisler et al. 2006). Grazing reduces the growth of *Aegopodium podagraria*, but *Chaerophyllum aromaticum* is avoided by animals, because it is poisonous. In smaller territories the area may be mown and then covered with black, thick film for the entire vegetation season. This must be done in early summer, while the plant has not managed to accumulate nutrient reserves in roots. The most efficient method is ploughing the field and elimination of the vegetation and seed bank by means of agrotechnical methods, followed by sowing of grassland species. Use of the herbicide glyphosate is efficient (Garske, Schimpf *without date*).

If *Aegopodium podagraria* or *Chaerophyllum aromaticum* has invaded a fertile grassland and after their elimination the development of a semi-natural grassland is planned, topsoil removal (*Anthriscus sylvestris* rhizomes are situated at a depth of 5–10 cm) and transportation away from the site, or deep ploughing in autumn (at least 40–50 cm deep) are most efficient. The frost will help destroy the roots and deep ploughing will prepare the ground for semi-natural grassland species both by reducing the seed bank of *Aegopodium podagraria*, *Chaerophyllum aromaticum* and other competitive species and nutrient removal.

Brachypodium pinnatum

Distribution in grasslands: a creeping grass species characteristic for dry grasslands in calcareous soils, and becomes expansive, if the grasslands are abandoned or eutrophicated – the soil is enriched with nitrogen, for instance, from the adjacent fertilised agricultural land or by atmospheric deposition.

Control: species that is very difficult to control. Efficiency of mowing is low. The best results can be achieved if mowing is performed at least twice per season with the removal of grass. The first mowing must be performed shortly before blooming (Bobbink, Willems 1991; Willems 2001). Grazing may limit the species, however, in general animals avoid eating it. To achieve the best effect, grazing animals must not receive supplementary feed, the grazing enclosure must not enclose large areas with tastier grass. The most appropriate animals are cattle and sheep or goats. Grazing must be commenced in early spring. The grassland may not be burnt, because burning facilitates the spread of species. The use of glyphosate to limit the species is not recommended, or is recommended in combination with other control methods, because it has been experimentally proven that the species initially disappears, but rapidly returns to the grassland, while other species of xeric grasslands die under the influence of glyphosate (Hurst, John 1999). Treatment of *Brachypodium pinnatum* with glyphosate in patches and grazing after the restoration of vegetation results in a reduction of the species.

Calamagrostis epigeios

Distribution in grasslands: the species is predominantly expanding in dry and mesic grasslands in different soils. Creeping grass, which rapidly overtakes the grassland and develops homogeneous stands. The species becomes expansive, if the grasslands are abandoned or eutrophicated – the soil is enriched with nitrogen, for instance, from the adjacent fertilised agricultural land or by atmospheric deposition.

Control: species that is very difficult to control. Efficiency of mowing is low. The best results can be achieved if mowing is performed at least twice per season with the removal of grass. The first mowing must be performed shortly before blooming. The decline in population is only observed after 7–8 years (Rebele, Lehmann 2001; Schuhmacher, Dengler 2013). *Calamagrostis epigeios* is one of the host plants for hemiparasitic *Rhinanthus* spp. Introduction of *Rhinanthus* spp. by sowing into the sward can weaken *Calamagrostis epigeios* (see Chapter 21.8.6) (Mudrak et al. 2014). Grazing is fairly inefficient, because animals avoid eating it. In order to achieve the best result, grazing animals must not be additionally fed, the grazing enclosure should not enclose large areas with tastier grass. The most appropriate animals are cattle and goats. Grazing must be commenced in early spring. In autumn, after first frosts, animals tend to eat this plant much more. The litter may not be burnt, because burning facilitates the spread of species. Treatment of *Calamagrostis epigeios* with glyphosate in patches and grazing after the restoration of vegetation results in slower recovery of the species. If *Calamagrostis epigeios* dominates the entire grassland, the most efficient method is topsoil removal (rhizomes of this species are situated at a depth of 5–10 cm) and their transportation away from the territory, or deep ploughing (at least 40–50 cm deep) of the territory can be performed in autumn. The frost will help destroy the roots and deep ploughing will prepare the ground for semi-natural grassland species by reducing the seed bank of *Calamagrostis epigeios* and other competitive species and nutrient removal.

Chamaenerion angustifolium

Distribution in grasslands: the species predominantly spreads in mesic and moist grasslands after abandonment or significant disturbances, for instance, fires, wild boar damage, many years of grass mulching or leaving the mown grass on the ground. Although seeds retain germination capacity for a short period of time only, the species reproduces vegetatively very well by means of lateral roots, the shoots are 0.5 – 3 m high and effectively compete for light and nutrients (Dunnett, Willis 2000).

Control: annual mowing usually reduces the number of plants in the first years already. Efficient species control is achieved by grazing, since the species is not resistant to this (Myerscough 1980).

Dactylis glomerata

Distribution in grasslands: *Dactylis glomerata* is sown in cultivated grasslands. Unlike other sown grasses, which disappear from vegetation over time, *Dactylis glomerata* remains and frequently starts to dominate, outcompeting other species. The species spreads by seed, vegetative reproduction is not characteristic, however it regrows well after grazing or mowing and creates a dense aftermath. Individual plants can persist in vegetation for many years. It is a common species in mesic semi-natural grasslands, except for acid soils, however, it has a low abundance there. It only starts dominating if the fertility of soil increases, especially, the amount of nitrogen.

Control: soil fertility must be reduced – in the first years mowing must be performed two times per season, the grass must be removed, thus preventing the dispersal of *Dactylis glomerata* seeds. The stalks of *Dactylis glomerata* quickly become hard, and grazing animals avoid eating it, if overgrown. The species does not tolerate trampling, therefore, if the grassland is intensively grazed in autumn, winter and early spring, its amount is reduced (Beddows 1959).

Deschampsia cespitosa

Distribution in grasslands: a species characteristic of mesic and wet grasslands, which starts dominating in pastures, because grazing animals avoid eating it due to its coarse and sharp leaves. *Deschampsia cespitosa* spreads and starts dominating in compacted soils (intensively grazed pastures or meadows mown by means of heavy tractor equipment), because it is adapted to soils poor in oxygen.

Control: in year-round grazing without supplementary feed, the population of tufted hairgrass is controlled by the animals that trample it, while in spring, when the grass is still tender, they readily eat it. If the tussocks are large, they can be shredded. In seasonal pastures, the pasture must be mown at the end of the grazing season. In compacted soils loosening of deeper layers of topsoil must be performed.

Deschampsia flexuosa

Distribution in grasslands: the species spreads in dry grasslands in sandy and acid soils of the habitat types 6120* *Xeric sand calcareous grasslands*, 6230 *Species-rich Nardus grasslands on siliceous substrates*, drier subtypes of 6270* *Fennoscandian lowland species rich dry to mesic grasslands*, especially if the grasslands are abandoned or eutrophicated – enrichment with nitrogen due to runoff from fertilised agricultural land, atmospheric deposition, as well as long-term grassland mulching or leaving of the mown grass in the meadow. Spreads after fires, which, possibly is facilitated by the freely available nitrogen after burning (Scurfield 1954).

Control: mowing once per season with the removal of grass (preventing the dispersal of seeds) reduces the amount of *Deschampsia flexuosa*. Grazing by sheep is efficient, however, only if no rich sources of other food are available. An additional positive effect in cattle pastures is created by trampling. Removal of turf to a depth of 10 cm is the most effective method for the restoration of sandy grasslands, otherwise the accumulated nutrients, together with turf containing *Deschampsia flexuosa* remains in the grassland even after mowing and hinders the establishment of other species in the grassland (Wilton-Jones, Ausden 2005).

Equisetum spp.*Equisetum sylvaticum**Equisetum arvense**Equisetum pratense**Equisetum hyemale*

Distribution in grasslands: forests are natural habitats of *Equisetum sylvaticum* and *Equisetum pratense*. *Equisetum arvense* is common in semi-natural grasslands, however it occurs in very small amounts. All mentioned *Equisetum* species tend to spread in grasslands after the disturbance of turf, for instance, wild boar uprooted turf, floods, abandonment or annual mulching of grass. Increase in soil acidity also contributes to the spread of *Equisetum* spp. *Equisetum hyemale* only spreads in dry sandy grasslands after they are abandoned.

Control: commencement of correct management of the grassland (annual mowing with the removal of grass or grazing), gradually reduces the quantity of *Equisetum* spp. Liming of acid soils also helps reduce the amount of *Equisetum* spp. Grazing by horses is an effective method of controlling *Equisetum hyemale*, especially during the winter.

Filipendula ulmaria

Distribution in grasslands: *Filipendula ulmaria* is a species characteristic for moist and wet semi-natural grasslands, however, after drainage, abandonment and many years of late mowing the *Filipendula ulmaria* can expand rapidly and completely take over the grassland, up to the degree where the herb layer contains almost no other species.

Control: commencement of correct management of the grassland (annual mowing with the removal of hay or grazing), gradually reduces the population of *Filipendula ulmaria*. Grazing by goats and sheep is an effective method. Cattle and horses tend to avoid them, but grazing in the winter could reduce the amount of this species. Its population is also reduced by trampling. Mowing twice during the vegetation season at the beginning of blooming with the removal of grass is also effective.

Molinia caerulea

Distribution in grasslands: *Molinia caerulea* is a species characteristic of moist and wet semi-natural grasslands, which may naturally dominate the vegetation without a negative effect on the diversity of other species. However, after draining, abandonment or after many years of late mowing (after mid-July) or frequent fires, it can spread rapidly and completely take over the grassland, to the degree where almost no other species are present in the sward. *Molinia caerulea* creates high tussocks, and therefore, if the grassland can be managed by mowing only, the tussocks must be cleared and their further development must be restricted.

Control: grazing animals avoid eating *Molinia caerulea*, however, controlled grazing by limiting animal access to pasture areas with tastier food yields good results. The most appropriate pasture animals are cattle. Overgrazing is not recommended, because it can totally eliminate *Molinia caerulea* from the vegetation. Mowing twice per season with the removal of grass also effectively limits *Molinia caerulea* (Taylor et al. 2001). If the area is very rich in tussocks, their shredding may be efficient, however, it will fail, if not followed by annual mowing with the removal of hay, or grazing.

Urtica dioica

Distribution in grasslands: the plant gets introduced in very fertile grasslands, especially in drained peaty soils that are rich in nitrogen. *Urtica dioica* expand in places where mulching is performed every year and around old hay stacks and bales. In pastures, it expands in feeding sites, or in places of concentration of animal excrement.

Control: grazing animals do not eat fresh *Urtica dioica*, but they are consumed in hay. Regular mowing limits *Urtica dioica* growth, but does not eliminate them. If the *Urtica dioica* have overtaken the entire area, mowing alone is inefficient. In order to eliminate *Urtica dioica*, the territory must be ploughed, agrotechnical measures for weed (including *Urtica dioica*) abatement must be implemented and the grassland must be developed anew. In drained peaty soils, moisturising or topsoil removal are effective methods.

Pteridium aquilinum

Distribution in grasslands: the species is spread in dry soils, especially if they are acidic. The main habitat of *Pteridium aquilinum* is pine forests, therefore, the species typically spreads from the forest edges.

Control: this fern cannot be controlled by grazing because it is poisonous to animals. Mowing twice a year in mid-June and mid-July is usually effective (Marrs et al. 1998; Pakeman 2002). Fairly good results have been demonstrated by pony grazing in late summer and early autumn, when the toxicity of *Pteridium aquilinum* decreases, and in spring when young shoots of fern can be trampled (Oates, Bullock 1997). *Pteridium aquilinum* is an efficient insulation material.

Rubus caesius

Distribution in grasslands: the species spreads in dry and, less commonly, mesic grasslands that have been abandoned. The plant creates biennial creeping shoots, which develop into new plants after rooting. The shoots are covered with many broad leaves, and plants can quickly cover the ground, thus suppressing other species. Shoots that have produced seeds die off.

Control: shoots of *Rubus caesius* are covered with thorns and grazing is not efficient for the abatement of the species, because animals avoid eating it – only young shoots that are not that sharp are eaten well. Mowing for several years limits the spread of the species, however complete elimination of the species from the sward may not occur for many years.

Phragmites australis

Distribution in grasslands: *Phragmites australis* spreads in wet grasslands, if they are abandoned. The abundance of *Phragmites australis* increases considerably as a result of eutrophication, if the grassland is enriched with nitrogen and phosphorus. If the management of grasslands is recommenced, the control of reed is usually difficult (Haslam 1972).

Control: reed can be controlled by mowing, grazing, burning and root tilling. Burning is required as an initial restoration measure, since grazing or mowing may not be possible in grasslands that have been abandoned for a long period due to accumulated reed litter (old stalks). Shredding of litter and reed rhizomes is an alternative to burning, however, it leaves a large amount of organic matter in the soil, which reduces the efficiency of restorative mowing and grazing. Annual burning alone does not limit the growth of *Phragmites australis*, the regrowth is even denser. Burning may only be performed in winter or early spring, when the birds have not started nesting yet.

Mowing is less efficient than grazing, however in many places it is the only way to restore the grassland. Mowing must be performed at least three times in summer, for the first time from late May until mid-June. The result will be noticeable in 3–4 years, after 5–10 years a significant reduction in the distribution of *Phragmites australis* usually occurs.

Phragmites australis is very sensitive to grazing, because its apical meristem (which allows the shoots to grow upwards) is situated above the ground and grazing animals can easily damage or eat it. Furthermore, grazing inhibits the movement of nutrients in the plant. *Phragmites australis* transport carbohydrates from the rhizomes to shoots in spring and store nutrient reserves starting from August, so if the reed is grazed before August, it cannot provide a sufficient amount of nutrient reserves for spring and starts to languish (Haslam 1972; Vulink et al. 2000).

If the vegetation is dense and the layer of dead *Phragmites australis* from previous years is thick, livestock grazing is not possible, because their movement is difficult. In order to prevent injuries to animal legs with the sharp stalks of *Phragmites australis*, it is recommended to mulch them very low after mowing. If a dense stand of *Phragmites australis* covers a large area, or if such stand separates one grassland from another, 2–4 m wide paths for animal movement must be created in such stand at a distance of 10 m from each other (narrow paths can warm up considerably in summer, because no free flow of air occurs there, and the animals will not use them). These corridors must be connected after every 20 m (a network of corridors is created). Grazing should be started in early spring, before reeds have opened their leaves and become green and before they have reached the height of 15 cm (when visually it still seems that there is nothing to eat). Animals willingly eat young shoots, because they are soft, very nutritious and sweet. Restoration will be more successful in the case of grazing – by fencing the grazed area with temporary fences and ensuring intensive grazing of grass and reeds. In mid-summer, when the *Phragmites australis* have already become lignified, livestock will not eat them anymore.

During the restoration period the grazing pressure must be higher than in well-maintained grassland, because the amount of nutrients in the soil is high, the plants grow faster and their biomass is higher than in a pasture that has been grazed for a long time.

In the case of low grazing intensity additional mowing is necessary. It is best to mow from mid-June to mid-July. It must be repeated at the end of summer if the reeds have not been grazed and grown tall in some areas (Vulink et al. 2000).

Shredding of *Phragmites australis* rhizomes is only an efficient method if it is combined with mowing or grazing. To destroy the rhizomes completely, shredding must be performed at least 10 cm deep. If the rhizomes are mulched and left in the grassland, reeds will regrow quickly, because vegetative reproduction of reed rhizomes is very efficient.