

Persistency of *Lolium perenne* in sward of pasture and meadow mixtures in post-boggy habitats

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Summary

Researches were carried out in years 1996-2005 in Sosnowica – the Wieprz-Krzna Canal Region. One pasture and two meadow experiments were set on peat-muck soil. Grass-clover mixtures with different share of *Lolium perenne* (30 or 35%) were sown. In the years of utilization controlled fertilization (N – 40, P – 35 and K – 100 kg ha⁻¹) was applied. In 2003 rate of nitrogen fertilization was increased to 70 kg ha⁻¹, because of large freezing damages after 2002/2003 winter. Pasture sward was grazed by Limousine cattle 4-5 times in the grazing season, whereas meadows were cut three times. In 1997-2002 the share of *Lolium perenne* in the pasture sward was stable (44-52%), while the share of this species in meadow sward increased systematically in the following years of the studies (37% – 1997 to 13% – 2002). Independently of the way of utilization, the share of *Lolium perenne* increased much (5-7%) after 2002/2003 winter season. In the next years, fast regeneration of this species (21-36%), especially in the meadow sward was noted. It indicates large regeneration ability of *Lolium perenne* after freezing damages.

The phenological differentiation of *Dactylis glomerata* cultivars sown in two row spacing during 3-years period of utilization

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Summary

The aim of this study is to evaluate the course of phenological phases of *Dactylis glomerata* cultivars sown in two row spacing (50 and 70 cm) during 3-years period of utilization depending on weather conditions. The studies were carried out in 2002-2005 in central Poland on *Dactylis glomerata* seed experiment on degraded black earth soil. Experiment was established in a split-plot system in four replications on 3 m² plots. Fertilization was (kg ha⁻¹): N – 100 in three parts, P – 30, K – 75 in two parts. The objects were six cultivars of *Dactylis glomerata* with different earliness and the ways of utilisation. The beginning and full of heading time and flowering were analyzed on 50 generative shoots from 1 m of row on each plot. Phenological observations and counting of shoots were conducted every few days from the time when generative shoots appeared until the end of flowering. In the conducted experiment, in three years, a high intervarietal differentiation of phenological stages of development was obtained. It was found that weather conditions affected the date and course of phenological stages, especially the start of heading, of the tested cultivars in the years. Weather conditions influenced also the intensity of each stage. It was also found that row spacing influenced the intensification of phenological phases (more intensive on 50 cm row spacing) and less their long duration. Amera cv. entered all phenological phases before the other cultivars did, whereas Astera was the latest.

Indukowana androgeneza w *Phleum pratense*

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Streszczenie

Pylniki dwudziestu genotypów tymotki były wykorzystane do indukowania androgenyzy i regeneracji roślin. Pochodziły one z odmiany Skaut: genotypy Sk₁ – Sk₁₀ i z odmiany Bartovia: genotypy Ba₁ – Ba₁₀. Najwyższą wartość indukcji androgenyzy zaobserwowano na pożywce Blayds'a z 2 mg l⁻¹ kinetyny lub 2 mg l⁻¹ BAP dla genotypu Sk₁ – 64%. Najlepszą efektywność androgenyzy zaobserwowano, kiedy pylniki były traktowane promieniowaniem gamma w dawce 1 i 4 Gy. Najwyższy procent embriogenezy otrzymano w kombinacji traktowania wstępnego pylników temperaturą 4°C przez 4 dni i 4 Gy dla genotypu Sk₂ – 6,7%. Liczenie chromosomów u zregenerowanych roślin wykazało, że większość regenerantów była alloheksaploidami 2n = 6x = 42 – klony Sk₁₋₁₀ – 36,9% i Ba₁₋₁₀ 35,4%. Haploidalnych roślin n = 3x = 21 otrzymanych z genotypów Sk₁₋₁₀ było 22,3% i 17,8% z genotypów Ba₁₋₁₀.

Utility value of selected grasses species and cultivars designed for recreational lawns

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Summary

In this report, utility features of selected gazon grass species (cultivars) sown pure and in mixtures on recreational lawns in Olsztyn Lakeland conditions were estimated. Microfield (1 m × 1 m), experiment was established in spring 1998, as randomised block design with three replicates on antropogenic soil formed from loamy sand, situated on Didactic-Experimental Unit area of UWM in Olsztyn. In 1999-2003 according to COBORU method (DOMAŃSKI, 1998b): winter hardiness, compactness, colour, leaf perfectness and general aspect in 9^o scale (1-bad mark, 5-sufficient, 9-the most desired mark) were estimated.

It turned out, that the most favourable features were obtained by: *Lolium perenne* Wiegławicki and *Festuca rubra* Pernille and Boreal sown pure. Among tested mixtures the best parameters were obtained by: mixture no. 14 designed in Chair of Grasslands and commercial mixtures – Johnsons Wimbledon, DSV Sport und Spiel and Barenbrug Universal. Species (cultivars) such as *Lolium perenne* Nadmorski and *Festuca rubra* Leo and mixtures no. 12 and 13, Nieznanice Uni and Rolimpex Ogrodowa showed a less favourable value.

Effect of sowing rate of a pasture mixture on plant emergence and herbage yield in different habitats

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Summary

In the study results were presented from the investigations of a pasture mixture with varying percentage of white clover seeds (20% and 40%) and sown at three rates (10,000,000; 20,000,000 and 30,000,000 seeds ha⁻¹) in three different habitats: arable field, pasture ley, and meadow renovated by Fillage method. Number of seedlings after emergence, percentage of white clover in the sward and dry matter yield of the mixture were determined. Number of seedlings increased but the emergence indicator declined with seed rate and was similar in all habitats (Table 1). The highest percentage of white clover and the highest output of the mixture were obtained on the arable field after potatoes fertilized with FYM and the lowest yield with a very small percentage of clover was obtained in the meadow habitat. On the pasture ley, the yield and the percentage of clover in the crop were intermediate (Tables 2 and 4). Increased level of the factors under study beneficially affected the percentage of clover in the sward under all habitats (Table 3). Instead, the yield of the mixture was significantly dependent on both factors only under pasture ley conditions. The study showed that, regardless of the habitat, the seed rate of 20,000,000 seeds ha⁻¹ was sufficient (Fig. 1). White clover performed best in the arable field which indicates that the percentage of white clover seeds in the mixture seeded in a beneficial environment can be lowered by as much as 20% as opposed to the meadow habitat in which 40% of clover seeds was more advantageous.

Influence of mowing frequency on general aspect of selected *Festuca* ssp. cultivars during seven-years performance

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Summary

The aim of study was to evaluate the reaction of selected lawn *Festuca* ssp. cultivars to mowing frequency during 7 years of extensive and moderate intensive utilization.

Study was carried out in 1996-2002 in Didactic-Research Station in Sosnowica (Department of Grassland and Green Forming, University of Agriculture in Lublin). Study included following cultivars: Areta, Jagna, Leo (*Festuca rubra* ssp. *rubra*), Nimba (*Festuca rubra* ssp. *commutata*), Sawa (*F. heterophylla*) and Terros (*F. arundinacea*). The experiment was established as randomized blocks in four replications on light mineral soil. During the vegetation period, number of mowing was 6-10 in extensive and 23-26 in moderate intensive way of utilization depending on year. Doses of mineral fertilizers were adjusted to by utilization and amounted to: N – 60, P – 17.5 and K – 40 as well as N – 240; P – 39.2; K – 121.2 kg ha⁻¹. General aspect of lawns was evaluated every year once a month from April till October according to the method used in COBORU.

Studies revealed that esthetic value of studied *Festuca* ssp. cultivars mainly depended both on mowing frequency and weather conditions in winter and during vegetation. Scores of general aspect for *Festuca* ssp. were higher on more often mowed objects, but cultivars stronger reacted to unfavorable weather conditions during vegetation than to conditions of reduced number of mowing. Frequency of lawn mowing most apparently affected the general aspect of Nimba cv. (*F. rubra* ssp. *commutata*) and Areta cv. (*F. rubra* ssp. *rubra*); the weakest influence was observed for Leo cv. (*F. rubra* ssp. *rubra*) and Sawa cv. (*F. heterophylla*).

Improvement of species composition of meadow sward with different share of *Deschampsia caespitosa* by direct drilling method

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Summary

Extensively managed grassland often contains a considerable amount of weeds among them *Deschampsia caespitosa* L. That species occurs mainly on organic soils, particularly when they are insufficiently fertilised with potassium and phosphorus and on grassland with low density of meadow sward. The results of an experiment comparing the control of *Deschampsia caespitosa* by mechanical (low cutting; rotary cultivation) and chemical (using Roundup) methods are presented. A trial was established on peat-muck soil, on grassland heavily infested with tufted hair grass.

Mechanical and chemical methods influenced significantly the species composition. Rotary cultivation after Roundup treatment was found to be the most efficient in terms of the botanical composition changes of the sward and its yielding. A proportion of *Deschampsia caespitosa* decreased from 40-60% in original sward to less than 10% in the end of the second year after sowing. Glyphosate (Roundup) application does not remove *Deschampsia caespitosa* completely because some of tussocks can grow again. Used renovation methods influenced on significantly increase of yields. From the mixture components *Festuca pratensis*, *Phleum pratense* and *Lolium perenne* were the most suitable for direct drilling into peat-muck soil. A share of *Deschampsia caespitosa* in the original sward affected the number of seedlings of sown species, their share in botanical composition of sward and yielding. The higher proportion of *Deschampsia caespitosa* in primary sward the weaker effects of renovation. Renovation of grassland by direct drilling method is cheaper (about 31-45%) in comparison to conventional methods (ploughing).

Usefulness of red clover and alfalfa for the cultivation with orchard grass on the arenosol types of soils

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Summary

The aim of the research project was to confirm the usefulness of red clover and hybrid alfalfa for cultivation with cocksfoot on the arenosol types of soils and to determine the yield-forming potentials of the above-mentioned components depending on the level of nitrogen fertilisation. Investigations were carried out in years 2002-2004. The experiment was established in spring 2002 in three replications in a split-plot design on 10 m² plots. The following experimental factors were taken into consideration: i/ mixtures ((*Dactylis glomerata* cv. Rada cultivated in pure sowing; *Dactylis glomerata* cv. Rada and *Trifolium pratense* cv. diploid Nike with 50% share of; *Dactylis glomerata* cv. Rada and *Medicago media* cv. multi-leaf Legend of 50% share), ii/nitrogen fertilisation: (0, 30, 60 and 90 kg ha⁻¹). Nitrogen fertilisation was applied for each regrowth using 1/3 of the dose. Additionally, potassium fertilisation was applied in the amount of 100 kg ha⁻¹ K₂O using 1/3 of the dose for each regrowth. Due to the high content of phosphorus in the soil, no fertilisation with this element was applied. Three cuts were harvested in each year of research; the first cut – at the phase of the earing of cocksfoot and the consecutive cuts, depending on weather conditions, 40-50 days after the harvest of the previous crop. Forage was weighed directly after cutting and the yield of dry matter was determined. In addition, 1 kg of forage was sampled from first regrowths to carry out botanical-gravimetric analyses. It was found that red clover and hybrid alfalfa cultivated in the mixture with cocksfoot increased their share in the sward in consecutive years of cultivation. The determined mean yield of the plant dry matter from three years of investigations showed that, in conditions of the arenosol types of soils, cocksfoot cultivated in pure sowing exhibited the highest yield-forming capacity. Nitrogen fertilisation exerted a positive influence on the yields of cocksfoot and its mixtures with red clover and alfalfa but the effectiveness of the applied dose of 90 kg ha⁻¹ N depended largely on the existing atmospheric conditions.

Porównanie pobierania przez jagnięta siana i kiszonki z kukurydzy

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Streszczenie

Celem badań było porównanie pobrania suchej masy siana z lucerny i naturalnej łąki z kiszonką z kukurydzy jako komponentów dawki pokarmowej dla odsadzonych jagniąt rasy Blackface Pleven. Doświadczenie przeprowadzono w 2005 roku. W momencie rozpoczęcia doświadczenia podzielono 20 jagniąt płci żeńskiej o masie ciała 21 kg na dwie grupy. Każda grupa otrzymywała taką samą ilość paszy treściwej 626 g w przeliczeniu na sztukę dziennie, złożonej z ziarna kukurydzy (178 g), pszenicy (224 g) i śruty słonecznikowej (224 g). Ponadto dawka była złożona z tych samych ilości w grupie 1 siana z lucerny i naturalnej łąki, a w grupie 2 z kiszonki z kukurydzy *ad libitum* (przy uwzględnieniu 10% niedojadów). Wymieszanie siana z lucerny i naturalnej łąki było konieczne dla zbilansowania zawartości białka ogólnego w sianie o kukurydzy. Pasze były zadawane dwa razy dziennie, zapewniając w dawce energię netto według danych z norm dla uzyskania przyrostów dziennych na poziomie 250 g zgodnie z dawkami akceptowanymi w Bułgarii w tuczu jagniąt. Pasze treściwe były zadawane w odrębnych pojemnikach, co uniemożliwiło ich zmieszanie z sianem i kiszonką. Pobranie kiszonki i siana było określane każdego dnia. Wyniki dla pobrania poszczególnych pasz są prezentowane jako wartości średnie dla każdego tygodnia prowadzenia doświadczenia. Okres badań trwał 6 tygodni. Przyrosty jagniąt były kontrolowane każdego tygodnia rano przed podaniem pasz oraz w dwóch kolejnych dniach rozpoczęcia i zakończenia badań. Skład chemiczny pasz stosowanych w doświadczeniu został oznaczony metodą wendeńską. Reasumując stwierdzono, że siano z lucerny i naturalnej łąki jest lepsze w żywieniu jagniąt o masie od 20 do 30 kg niż kiszonka z kukurydzy.

Influence of the intensity of meadows utilization and the habitats moistening on the phytocenosis of drainage ditches

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Summary

The aim of this study was to determine the number of plant species in drainage ditches and its dependence on the utilisation intensity of meadows and the level of moisture of the former marshy sites. Investigations were carried out in years 2003-2005 on a former ameliorated marshy meadow object situated in the Supraśl valley. The assessment of the species diversity of phytocoenoses in drainage ditches was carried out in the following two different sites: wet intensively utilised and dry extensively utilised with two ditches from each of these sites selected for experiments. Three investigation areas of 25 m² each were selected in each of the above-mentioned ditches depending on their cross section and depth. Floristic lists of plant species were prepared with the assistance of the Braun-Blanquet method. Phytosociological surveys were made in each site twice a year in years 2003-2005, so that during the entire period of investigations 18 phytosociological surveys were taken from the wet site and the same number of surveys from the dry site. In the course of the performed investigations, the occurrence of a given species in the sward expressed according to the Braun-Blanquet method was determined and the degree of permanence for individual plant species was calculated.

The total of 42 plant species were found to occur in the examined drainage ditches in the former marshy sites. More plant species were determined to occur in ditches situated on the dry, extensively utilised site (36) than in ditches situated on the wet, intensively utilised site (33). Plant species from the wet site were characterised by high stability. In the case of the dry, extensively utilised site, despite the greater number of plant species, they were characterised by lower stability in comparison with the wet site. In comparison with spring, during the autumn period, fewer plant species were found in the examined drainage ditches. The utilisation intensity of former marshy meadows was found to have affected the plant species numbers in the phytocoenoses of the examined drainage ditches of both types of the examined former marshy sites.

Biological and chemical properties of *Sorghum saccharatum* from the point of view of possibilities of its cultivation in Poland

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Summary

The goal of the performed experiments was to recognise chemical and biological properties of *Sorghum saccharatum* important from the point of view of its cultivation in the climatic and soil conditions found in the region of Wielkopolska. The material for investigations carried out in years 2004-2005 derived from four cultivation combinations established on the basis of our current knowledge on the subject:

- Combination A – cultivation of sorghum in pure sowing, plant density – 180 000 plants ha⁻¹, inter-row spaces – 70 cm, frequency of plants in a row – 7 cm.
- Combination B – Mix-cropping – cultivation of sorghum and maize in mixed sowing, the row arrangement (1:1): sorghum-maize-sorghum-maize, plant density – 90 000 sorghum and 40 000 maize plants ha⁻¹, inter-row spaces – 70 cm, frequency of plants in rows: sorghum – 7 cm, maize – 17 cm.
- Combination C – Mix-cropping – cultivation of sorghum and maize in mixed sowing, the row arrangement (2:1): sorghum-sorghum-maize, plant density – 130 000 sorghum and 25 000 maize plants ha⁻¹, inter-row spaces – 70 cm, frequency of plants in rows: sorghum – 7 cm, maize – 17 cm.
- Combination D – control combination; cultivation of maize in pure sowing, maize plant density – 90 000 plants/ha, inter-row spaces – 70 cm, frequency of plants in a row – 15 cm.

Fertilisation per hectare was as follows: N – 160 kg, P – 80 kg, K – 170 kg of pure component.

The adopted criteria of assessment of sorghum and maize cultivation included the following wide spectra of biological and chemical properties: shoot height, structure of their organs, the yield of the over ground weight, plant vitality and crude protein, carbohydrate-lignin complex, nitrates, selected mineral components. The results of our investigations show sweet sorghum as an interesting fodder plant. The characteristic features of its chemical composition include: higher level of cellulose and lignin deposition and favourable mineral composition. Sweet sorghum can be treated as a fodder crop complementary for maize. This assessment of sweet sorghum is supported by its high vitality and resistance to difficult soil thermal and moisture content conditions. The applied mixed sowing of sweet sorghum and maize gives good production results. The yield of the shoot over ground weight of sweet sorghum and maize as well as the costs of its production are the decisive factors influencing the decision concerning the choice of the cultivation variant on a given farm.

**Occurrence of *Calamagrostis epigejos* in grass communities
in Wielkopolska**

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Summary

Its optimum of occurrence *Calamagrostis epigejos* reaches in nitrophilic communities of forest fellings, trodden and ruderal areas – *Epilobietea angustifolii*. In the case of meadow communities, this species is found most frequently in *Koelerio glaucae-Corynephoretea canescentis* class, as well as in *Molinio-Arrhenatheretea*, in *Molinietalia* and *Arrhenatheretalia* orders where it develops impoverished degradation forms. The share of the *Calamagrostis epigejos* in the sward correlated reversely with the species abundance and floristic diversity of syntaxons and positively – with the proportion of synanthropic species in the sward.

An attempt to use usage-seed value index to evaluate perennial ryegrass pasture cultivars

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Summary

Evaluation of grass varieties refers to the usage value only. The purpose of this work was to obtain, more complex evaluation of cultivars, including usage-seed value. It was carried out by using a simple, synthetic index of usage-seed value (WUN). It was based both on dry mass yield and seed yield. Suitability of three index varieties was tested on the results of field experiments for 14 perennial ryegrass varieties.

It was found that the most suitable for these purposes can be the use of a simple, uniform index of usage – seed value (WUN). Ranking of cultivars by economic value was prepared. Standard cultivar (that has the highest potential both for seed and dry mass yield) was established. This index can be considered as a universal feature and can be used for the evaluation of different sets of perennial ryegrass cultivars. The most suitable index of three checked is WUN_{II}. This index presents both yields (dry mass and seed) and can be shown by their economic value.

Nutrient content in organs of meadow plants in different conditions of management intensity

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Summary

The aim of the study carried out on permanent grassland was to estimate mineral content in different organs of grasses and nutrient ratios depending on the intensity of management. Field trial was established in moderate wet site (level of ground water table about 30 cm). Three levels of management intensity were applied: A - 6 cuts per year and 180 kg N ha⁻¹y⁻¹, B - 4 cuts per year and 120 kg N ha⁻¹y⁻¹ and C - 3 cuts per year and 90 kg N ha⁻¹y⁻¹. A special attention was paid to N, P, K, Mg and Ca content in plants. Chemical analyses of plant material were done for each regrowth separately for leaves, stems, inflorescences and roots for each treatment, using standard method. A lot of macroelements accumulated in aboveground plant biomass especially in leaves. Content of N, P, K and Ca was higher in the treatment of 180 kg N in comparison with to extensive use. The highest cutting frequency and dose of nitrogen fertilisation increased values of K:Mg and Ca:Mg ratios but decreased Ca:P ratio.

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The influence of some characteristics of soils of flood terrace of the upper Bzura river on non-forest plant communities

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Summary

The aim of the performed investigations was to analyse selected physico-chemical properties of surface soil layers as well as botanical composition of phytocoenoses occurring on the flood terraces of the upper Bzura River. The studies comprised soils and non-forest vegetation along a 16 km section of the flood terraces of the upper Bzura River. The following six research sites were established along the river bank at the distance of 3 to 30 m: the first one (control) – situated in the non-degraded part of the valley, while the remaining 5 sites were selected in the area earlier subjected to strong anthropo-pressure. Soil pits were dug on each site (14 pits in total) from which soil samples for analyses were taken. Simultaneously, botanical investigations were conducted in the neighbourhood of soil pits. Plant communities were examined with the assistance of the commonly applied Braun-Blanquet method taking 14 phytosociological surveys from the area of 25 m² in the vicinity of each soil pit. It was concluded that the current condition of the soil environment of the upper Bzura River flood terraces was influenced significantly by degradation processes. In the majority of the examined soils, the authors found chemical and hydrological degradation evident, among others, in the excessive weeding, low content of available forms of P, K and Mg as well as excessive drying of surface soil layers. The observed floristic impoverishment of the investigated section of the valley bottom is most probably closely associated with the above-mentioned physico-chemical and moisture content soil properties. The majority of the examined soils should be subjected to liming, fertilisation and the existing plant cover should be cut and, wherever possible, farmed.

Effects of nitrogen fertilization on physiological processes, leaf greenness index and yields of orchard grass and perennial ryegrass

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Summary

The rate of photosynthesis, rate of transpiration and leaf greenness index (Soil Plant Analysis Development) and yields of selected cultivars of orchard grass and perennial ryegrass, grown on mineral soil under conditions of differentiated nitrogen fertilization, were studied in a greenhouse experiment. The rates of photosynthesis and transpiration were measured with a LI-COR 6400 portable gas analyzer, and leaf greenness – with a SPAD 502 optical chlorophyll meter (Minolta). Dry matter yield was determined by drying the collected biomass at 105°C, to constant weight.

The obtained results show that nitrogen fertilization significantly increases the rate of photosynthesis, leaf greenness index and yields of perennial ryegrass and orchard grass and limited leaf transpiration. Intensity of the photosynthesis process and the transpiration indicate big variability in the vegetation period, however the level of chlorophyll in leaves is comparatively stable. Nitrogen fertilization was stimulated by physiological processes and the level of chlorophyll in leaves of grass. Perennial ryegrass cultivars contained more chlorophyll in leaves and reacted to nitrogen fertilization more strongly than orchard grass. Increase of the yield, in comparison to the control objects, was in them higher than in cultivars of orchard grass.

Susceptibility of turf cultivars of *Lolium perenne* and *Poa pratensis* to diseases

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Summary

The investigations were conducted in 2001-2004 in the Plant Breeding Station at Skrzyszowice near Krakow. In the experiment two amenity grass species i.e.: perennial ryegrass (*Lolium perenne*) and smooth-stalked meadowgrass (*Poa pratensis*) under two type of turf maintenance: park and relax were subjected to estimations. Infection by diseases was done on the basis of 9-degree scale. Registered Polish cultivars of *Lolium perenne* L. Nira and Stadion as well as *Poa pratensis* L. Alicja and Gol constituted the subject of the experiment. Great diversifications between results for the particular years of investigations, different methods of turf maintenance and between examined species were found. Differences between cultivars were of lower importance. Perennial ryegrass was characterised with the highest susceptibility to pink snow mould (*Microdochium nivale*) in the first and second year under the park maintenance and in the third year under the relax maintenance. In the case of smooth-stalked meadowgrass infection occurred only in the first year and was more intensive for the Gol cultivar. Helminthosporium leaf disease (*Drechslera siccans*) in perennial ryegrass occurred in the sowing year as well as in the autumn of the third year, whereas in the summer of the first year and in the second year it was not noticed. More susceptible to infection were plants under park maintenance. Smooth-stalk meadowgrass was affected by the *Drechslera poae* only in the first year and only in the case of Alicja cultivar to a low degree. Perennial ryegrass during the autumn of the first year of investigations was infected with rust (*Puccinia coronata*). However infection affected only plants under the park maintenance. Smooth-stalked meadowgrass appeared to be more susceptible to rust disease. Yellow rust infection was observed in the year of sowing, it appeared also in the following years. Obtained results suggest that perennial ryegrass is more susceptible to pink snow mould and leaf spot, whereas smooth-stalked meadowgrass is less resistant to yellow rust.

Aboveground biomass formation of *Lolium perenne* depending on nitrogen fertilisation and cutting frequency

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Summary

The aim of this study was to analyse the influence of mineral fertilisation and cutting frequency of *Lolium perenne* plants on length of vegetative and reproductive tillers, their contribution in mass in each cut and stubble mass (base of tillers).

The investigations were carried out on particular tussocks (4 tussocks in each re-growth) of *Lolium perenne* in the first and second year after planting out (30 × 30 cm). Plants were cut 3 and 6 times. There 4 fertilisation treatments were applied (kg ha⁻¹): N – 0, 120, 240 and 480 in equal rates per cut, P – 30 and K – 100 in one rate in spring.

It was found that nitrogen fertilisation as well as the increasing rates of nitrogen, irrespectively of cutting frequency, influenced positively, especially at three cuts utilization, all evaluated features of *Lolium perenne* plants. At three cut utilization, the first cuts were done in terms of cutting of productive meadows (heading phase of dominated grass species). These terms occurred too early for *Lolium perenne*, which at that time was only in the stem elongation phase. Because of that, reproductive tillers reached the full development in the second re-growths. At six cut management, the plants were cut at 20-30 cm heights. It was found that there were no generative tillers in the first re-growths. This type of tillers occurred in great number at second re-growths. The mass of tillers depended on the mass of reproductive tillers and the weather conditions. The frequency of cutting exerted no significant influence on annual yields of *Lolium perenne*. The stubble mass systematically developed in the following two years and the nitrogen fertilisation had no distinct influence on their mass in comparison with yield.

Historical aspect of Czersk meadows

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Summary

The complex of Czersk meadows boasts a very rich history. The beginnings of those meadows go back to, at least, the 15th century but their agricultural utilisation in the present form began almost 170 years ago. The establishment of the complex coincided with the clearing of forests and the amelioration and appropriate management of the existing meadow enclaves. The idea of the establishment of such a large meadow complex was born at the beginning of the 19th century and was realised in its entirety. Properly managed and rationally utilised and tended, they have survived to this day in the form of pastures. The Czersk meadows represent a peculiar element in the meadow economy of our country and should constitute a pride of this region. The high value and importance of this meadow complex should be confirmed by the inclusion of this area to the ecological system of European Protected Regions.

Nutritive value of renewed grassland sward in the Notec Valley

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Summary

The aim of the research was to evaluate the nutritive value of fodder obtained from a renewed sward sown with a grass-clover mixture. The field research was conducted in years 1998-2001 in the Notec Valley in the village Nowe Dąbie. The experimental field was established on a degenerated pasture on V quality class soil. In sowing mixtures, the dominant species (30%) were different cultivars of meadow fescue: 'Skra', 'Pasja', 'Justa', BAH 197 as well as orchard grass cultivars: 'Amera' or 'Aster'. The remaining components of the mixture were: timothy grass – 'Kaba' (10%), perennial ryegrass – 'Argona' (10%), red fescue – "Atra" (15%), white clover – 'Rawo' (20%), red clover – 'Karo' (15%). The swards were under cutting and simulating grazing utilization.

The assessment of the chemical composition of sward concerning the content of crude protein, crude fibre, phosphorus and calcium was conducted on an InfraAnalyzer 450 machine using near infra red spectroscopy. The evaluation of energy and protein value of the fodder (UFL, PDIN) was based on the French system INRA, while the calculations were made using INRAration software. The nutritive value of the sward mixtures during their utilization usually corresponded with the requirement for good fodder. The content of nutrients such as crude protein, crude fibre, calcium and phosphorus, as well as the concentration of energy depended mainly on utilization frequency and botanical composition of the renewed sward. Swards utilized in the early phases of growth had a higher energy and protein value.

Estimation of morphological and biological features of *Festulolium* cv. Felopa depending on the harvest time of the first regrowth

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Summary

The aim of this study was to estimate suitability of *Festulolium* cv. Felopa for intensive fodder production on arable land on the basis of morphological and biological features depending on the harvest time of the first regrowth. Field experiment was carried out in years 1999-2001 at the Institute of Soil Science and Plant Cultivation – Agricultural Experimental Station Grabow (Mazowieckie Voivodeship). Plots on grey-brown podsolic soil, on very good rye complex (pH 6,7, P₂O₅ – 188, K₂O – 56, MgO – 25 mg kg⁻¹) were established. It was assumed that the first cut would be harvested 5 times, starting with the gathering carried out when growing point was 10 cm above the ground, and followed by 4 every-week gatherings: shooting stage – 2, early heading of grass – 3, full heading of grass – 4, beginning flowering of grass – 5. Swards were cut five times per season. Trials were sown on the 14th of April. The total seeding rate was 40 kg seeds per 1 ha. The plots were fertilized as follows: P – 19, K – 70 and N – 300 (60+60+60+60+60) kg ha⁻¹ in the years of utilization.

The studies showed that *Festulolium* was characterized by the best percentage of leaf blades and vegetative tillers in dry matter yield, which permits obtaining good nutritive value crops. The highest percentage of leaves in dry matter was obtained when growing point was 10 cm above the ground and shooting stage. The early gathering of *Festulolium* caused that plants were weak during next cuts and gave fewer numbers of tillers per 1 m². *Festulolium* may be ranked on the same level with the main forage grasses *Festuca* and *Lolium* grown in climatic conditions of Poland.

Effect of nitrogen fertilization on seed yield of *Lolium perenne* depending on the sowing method and date

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Summary

The aim of the present research was to analyze the production effects of selected sowing methods and dates and nitrogen fertilization rates when growing perennial ryegrass lawn cultivar, Stadion, and to evaluate the economic effectiveness of the applied nitrogen rates. An exact field experiment was carried out in two series, each of them including one year of sowing and two years of full use. Perennial ryegrass was sown in spring in pure stand or as the undersown grass with spring barley grown for green crop and with spring barley grown for grain as well as in autumn in the first days of September. In spring, in the years of full use, nitrogen fertilization was used at the rates of 0, 30, 60, and 90 kg ha⁻¹ N. It was demonstrated that nitrogen fertilization determined the yield of perennial ryegrass more than the sowing methods and dates. A greater effect was observed in the first year of full use in which every additional 30 kg N, ranging from 0 to 90 kg ha⁻¹, increased the seed yield significantly; in the second year such a relationship was noted only up to the fertilization rate of 60 kg ha⁻¹ N. Reactions of plants to the sowing methods and dates were significant only in the second year of full use in which perennial ryegrass sown in pure stand in autumn and in spring with barley grown for grain produced lower seed yields than when sown in spring without cover crop. Increasing the perennial ryegrass productivity was mainly due to the increasing number of seeds per spike and, less considerably, the number of generative tillers. Perennial ryegrass yield increased due to nitrogen fertilization at the rates up to 60 kg ha⁻¹ N. The financial value of the increases was 6 to 11-fold higher than the cost of the fertilizer, whereas increasing the nitrogen rate from 60 to 90 kg ha⁻¹ was of little effectiveness in the first year of full use, while in the second one – completely non-profitable.

Persistency and productivity of pasture sward with *Poa pratensis* content under postboggy habitat

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Summary

The grazing studies were conducted in the fourth to eighth year of experiment, established in 1996 and located on peat-muck soil. A randomized block design with four replications was used. Seven cultivars of *Trifolium repens* were included to grass mixtures with *Poa pratensis*, *Phleum pratense* and *Dactylis glomerata*. Grass-clover swards were fertilized with 40 kg ha⁻¹ N. Additionally grass mixtures, containing only the above mentioned grass species were sown and their fertilization was differentiated to 40, 80 and 120 kg ha⁻¹ N. The pasture swards were grazed rotationally four times during a grazing season. The aim of the studies was to determine the persistency of *Poa pratensis* and sward productivity under postboggy habitat. The content of *Poa pratensis* depended on the year of pasture utilization and the regrowth succession. Presence of this species was increasing together with the sward age. The highest quantity of *Poa pratensis* was noted in the first sward regrowth. Productivity of the pasture sward was rather high and differentiated significantly in the following years. The effect of nitrogen fertilization (40-120 kg ha⁻¹ N) on the sward yielding under peat-muck soil was low and usually not parallel to the dose of nitrogen.

Differentiation of phytocenosis and natural values of littoral plants zone of Starzyc Lake

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Summary

The study presents research results about structure and occurrence of plant communities in the Lake Starzyc riparian zone in West Pomerania region. Habitat conditions were favorable for hydrophilic species to create original associations. Ten (10) associations with different botanic composition were selected. Monoculture and multicultural communities were found. Highest floral variation was found in following communities: *Typha latifolia* with *Glyceria maxima* and *Glyceria maxima* with *Typha latifolia*, and *Glyceria maxima* with *Phragmites australis*. The most frequent species were: from grasses *Glyceria maxima* and *Phragmites australis*, from sedge family (*Carex*) – *Acorus calamus* and *Typha latifolia*. Contribution of dicotyledonous in investigated associations varied from 2.0 to 7.8%. Most distinguished species in plant associations were *Lycopus europaeus*, *Berula erecta*, *Epilobium hirsutum*, *Veronica anagallis-aquatica* and *Mentha aquatica*. *Solanum dulcamara* and *Mentha aquatica* were the most faithful species among analysed communities. Species with high natural value were rare. Flora of Starzec lake riparian zone represented very high nature value.

Effect of different methods of meadows renovation using *Festulolium* on botanical composition and yield of sward

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Summary

The report presents the variation of the share of *Festulolium* in the species composition and how a meadow turf yields in relation to various pratotechnical factors. In the conducted investigations, it was found that the kind and dose of a biological substance employed and the *Festulolium* seeds sowing norm significantly determine the species composition and plant yielding in the successive years of full utilization. The significantly higher yielding and lower weed infestation of the meadow turf were estimated after full seed norm had been used, compared with subseeding at a lower norm. The mean share of mixed species after the application of glifosat was almost 3 times higher compared to its share in treatments where fluroxypyr was used. After spraying with glifosat, it was found that the share of the mixer was significantly the highest in the species composition (56.2% d.m. on average), and yielding of the meadow turf (94.8 dt d.m. on average) the highest.

Evaluation of sites of the Wieprz river valley in the Roztoczański National Park phyto-indicative method

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Summary

Phyto-sociological relevés were taken in vegetation seasons 2003 and 2004 in part of the Wieprz river valley in Roztoczański National Park by means of Braun-Blanquet's method. Thirteen plant communities belonging to four phyto-sociological classes according to Matuszkiewicz were distinguished: **Phragmitetea** (*Caricetum acutiformis*, *C. rostratae*, *C. elatae*, *C. gracilis*, *Phalaridetum arundinaceae*, *Sparganio-Glycerietum flutantis*), **Molinio-Arrhenatheretea** (*Juncoco-Molinietum*, *Scirpetum silvatici*, *Caricetum caespitosae*, community *Deschampsia caespitosa*, *Alopecuretum pratensis*), **Scheuchzerio-Caricetea nigrae** (*Calamgrostietum neglectae*), **Nardo-Callunetea** (*Polygalo-Nardetum*). Taking into account the floristic composition of phyto-sociological pictures, mean values of insolation, temperature, continentalism, humidity, soil acidity and nitrogen abundance were calculated for communities applying the method by Ellenberg *et al.*, (1992).

Studies and calculations revealed that value of L coefficient was the highest in *Scheuchzerio-Caricetea nigrae* class represented by *Calamgrostietum neglectae* community, which amounted to 7.98. The least light requirements were observed for *Alopecuretum pratensis* (L = 6.42) and *Sparganio-Glycerietum flutantis* community (L = 6.54). The wettest habitats accompanied *Calamgrostietum neglectae* community. The driest and least soil acidity requirements occurred in *Polygalo-Nardetum* community. At the same time, it was characterized by the lowest level of continentalism.

Evaluation of quality and nutritive value of forages produced from meadow sward dominated by sedges

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Summary

Grasslands located in wet habitats have high natural, landscape values and reach biodiversity unparalleled in Western Europe. Recently, because of low nutritive value of obtained forages, they are not cut which leads to their overgrowing. The study was conducted in Experimental Farm in Biebrza, in years 2002-2004. The aim of the study was the evaluation of the quality and nutritive value of feeds made of sedge herbage. Ensilaged herbage was harvested from two meadows situated in and near the area of the Biebrza National Park. It was vegetation of *Calthion* alliance consisting in 70–80% of low sedges (meadow I) and vegetation of *Magnocaricion* alliance composed in 80% of sedges, mostly *Carex gracilis* (meadow II). Half of the ensilaged material was inoculated with Polmazym (1 l t⁻¹ of herbage). For comparison, the herbage from cultivated meadow composed in 80% of grasses and in 20% of herbs and weeds was ensilaged. At the same time, sedge herbage was dried for hay. In winter period the silages were tested and compared with the value of hay from sedge herbage and silage from cultivated grasses on 32 heifers divided into 4 feeding groups. These groups were: group I – fed with sedge silage, group II – sedge silage supplemented with Polmazym, group III – hay of sedges and group IV – silage from cultivated meadow. The quality of sedge silage, and particularly silage plus the additive, was as good as the quality of grass silage. The use of sedge silage in heifer feeding allowed to obtain body gains at the level 700 g per day. These gains were significantly higher than gains in the group fed with hay and a bit lower than gains in the group fed with grass silage. Sedge silage, particularly with the addition of inoculum is better forage than hay made of the same type of herbage and is equal to grass silage with regard to quality and feeding usefulness.

Absorption of legal tender within the limits of PROW project in regard to permanent grasslands in District Siedlce

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Summary

The aim of the research project was to analyse absorption possibilities of financial resources within the framework of the Development Plan of Rural Areas (DPRA) concerning packages and variants of the 4th Action Plan which comprise permanent grasslands in the Siedlce region. The source materials (numerical data – was obtained from the Regional Office for Agriculture Restructuring and Modernisation and Agriculture Advisory Centre in Siedlce) were presented in tables as well as in graphic form regarding the following three packages: extensive meadow management, extensive pasture management and ecological farming. The performed analysis revealed that the highest number of applications for the support of agro-environmental undertakings on permanent grasslands in the Siedlce region in 2005 concerned the management of extensive meadows. Local farmers were most interested in subsidies for semi-natural single-cut meadows harvested mechanically, whereas the package associated with the management of extensive pastures failed to attract their interest completely. The total area of permanent grasslands covered by subsidies in 2005 in the Siedlce region amounted to 270.15 ha and constituted 0.97% of the total area of meadows and pastures situated in this region. The total amount of subsidies for the Siedlce region for the maintenance of extensive meadows and pastures in 2005 reached 16 552.8 €.