Dry grasslands in European countries

This section is devoted to overviews of dry grassland research activities in different countries/regions of Europe. We believe that exchange of information can help all of us to get a better understanding of the overall situation of dry grassland research and conservation. Our expectation is that stimulating articles on dry grassland research topics and stories of successfull protection will encourage everybody to seek for closer cooperation and for new horizons in dry grassland research.

Different types of contributions are welcome for this section as the present status of dry grassland research and protection in a particular region is determined by several aspects, e.g. the history of overall vegetation (ecosystem) research, nature conservation priorities in the area, the possibilities of cooperation among scientists and practitioners, etc.

We would highly appreciate contributions of our members to this section. They should preferably fit in one of the following categories:

- *overview of dry grassland research/protection/restoration in your country/region (incl. list of publications etc.);*
- *single aspect of dry grassland history in your country/region e.g. history of dry grassland research/protection/ restoration;*
- *personalities who contributed or who are contributing to dry grassland research/protection/restoration;*
- *successful/significant project contributing to dry grassland research/protection/restoration;*
- *interesting results of dry grassland research, information on the state of the phytosociological database, etc.*

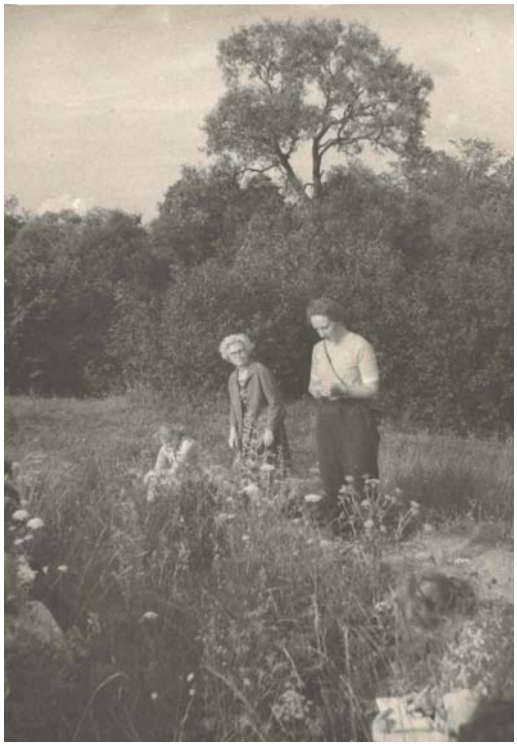
History of dry grassland vegetation research in Latvia

As Latvia is a small country, it seemed not to be a problem to collect information on the research and publications devoted to dry grasslands. However, the information older than 20 years was scattered over different information sources and titles of many of them did not raise the expectation to find anything about dry grasslands. For example, many publications of the 20th century on classification of grassland vegetation were published in a periodical called *Proceedings of the Institute of Zootechnics and Zoohygiene*. Due to the strong tradition to separate zoological and botanical research I restricted the following overview to studies dealing with dry grassland vegetation.

Dry grasslands cover approximately 2,000 ha and they are scattered in small fragments mainly in river valleys and along the coasts of the Baltic Sea and the Riga Gulf. Dry grasslands have attracted attention of biologists and ecologists only during the last 15–20 years. Vegetation research started in Latvia in the beginning of the 20th century but data on semi-natural grassland vegetation were fragmentary and mostly unpublished until the mid 20th century (only as diploma and PhD theses). The reason was the very low attractiveness of dry grasslands as a research object because neither scientific community nor any part of society perceived dry grasslands as a value from any point of view.

The Northern Gauja monitoring site after rain, 2006. Photo: S. Rūsiņa.

The first significant research of dry grasslands started in mid 20th century when the intensification of agriculture called for an overview of grassland resources for expanding husbandry. As a result, the description and classification of grassland plant communities developed as an important research direction for several years. In the same time some other investigations concerning semi-natural grasslands (the ecology of grassland species and communities, phytoindication, vegetation structure) were also carried out, mainly under the guidance of G. Sabardina. The main goal of these investigations was again to provide the best solutions for semi-natural (incl. dry) grassland improvement (Table 1).



G.Sabardina (from left) and A.Āboliņa in 1961 during the Expedition of Baltic Botanists in Latvia. Photo from A.Āboliņa's personal archive.

Depending on the classification approach, three periods can be distinguished in Latvia. The economical typology was based on meadow and pasture quality, and it was actively used at the beginning of 20th century up to the 1960s (Vārsbergs, 1923; Tērauds, 1954; Sabardina, 1958). The necessity of such a typology was called forth by the rapid development of agriculture at the end of 19th century and the beginning of the 20th century and conversion from grain farming to livestock farming.

In Latvia, the first vegetation classification based on features of the vegetation itself was the dominant method widely used in Russia at that time (Aleksandrova, 1969; Mirkin et al., 2002). It was used in geobotanical divisioning, but most important were G. Sabardina's works (Sabardina, 1957). New trends in vegetation research appeared in the 1980s when the first papers were published in which plant communities were investigated and classified according to the Braun-Blanquet phytosociological methodology. Although the aim of the research – to develop the classification of Latvian semi-natural grassland vegetation – did not change in this period either, there were several circumstances promoting the development of a new classification system and consequently the change of method.

Firstly, more and more criticism appeared both from European and Russian scientists arguing that the dominant method is not effective in polydominant plant communities, but the majority of semi-natural grasslands are such (Aleksandrova, 1969; Mirkin, Shelyag-Sosonko, 1984; Rabotnov, 1983). The weakness of this approach was also a lack of vegetation relevés or their inaccessibility to a wider audience. Plant communities described in the earlier periods of vegetation research in Latvia were not documented with relevés. The content of these communities is not known, and it is not possible to make a comparative analysis between different authors of that period and contemporary investigations.
Secondly, the previous classification ignored many rare and endangered plant communities. These include all dry calcareous and sandy meadows and pastures in Latvia. Thirdly, beginning with the 1990s international cooperation in nature protection and management of biological diversity broadened creating a necessity for common understanding of plant communities and habitats.

Although vegetation classification based on the Braun-Blanquet approach started in the early 1980ies, the progress was slow. Only 1–2 publications per year appeared in the period from 1980 to 1997. Most of them were devoted to forest and mire vegetation. Until 2006 vegetation scientists were employed at different institutions and there was no national-level project aiming at surveying vegetation of the country. Hopefully, things will change during the next years. In 2007, the Laboratory of Geobotany was established at the Institute of Biology of the University of Latvia under the leadership of Dr. habil. geogr. Māris Laiviņš (four persons are employed at the laboratory). The staff of the laboratory in collaboration with vegetation scientists from other institutions has prepared a project proposal to the Latvian Academy of Sciences with the main goal to publish an overview of plant communities of Latvia.

The overview of the current status of dry grassland research in Latvia will be published in the next issue of the Bulletin.

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Table 1 Semi-natural Grassland Research in Latvia

Research direction	*References*	*Results*
Vertical and horizontal structure of vegetation		
The influence of fertilisation on vegetation structure	Sabardina et al., 1967; Sabardina & Jukna, 1968	The influence of N, K, P, Cu, Mo, and B on vegetation structure (not in dry grasslands)
Ecological profiles	Sabardina, 1949; Sabardina &, Vielichko, 1970; Sabardina, 1952a,b, c; 1968	The spatial structure of plant communities (focusing mainly on river and lake flood-plains). Ecological profiles included also dry grasslands
Productivity of semi-natural grasslands		
Measurements of primary biomass both single and repeated (during several following years) measurements	Konrāds, 1939; 1948; Tērauds, 1954; Sabardina, 1955; Kļaviņa et al., 2001;	Productivity of the most common plant communities (incl. only some dry grassland communities). Conclusion: the productivity of semi-natural grasslands can fluctuate more than 100% depending on the average yearly weather conditions
Vegetation ecology and phytoindication		
Ecological amplitude of vascular plants, bryophytes, and plant communities; Identification of indicator species; Radioactivity of vascular plants	Eglite, 1967; Kristkalne, 1955; Klavina, 1965; Kļaviņa, 1966; 1967; Fatare, 1966; 1967; Jukna, 1964; 1966; 1967; Sabardina et al., 1973; Sabardina & Jukna, 1960; Sabardina, 1964; Sabardina et al., 1971; 1973; Sabardina & Jukna, 1968; Shalajeva & Sabardina, 1971	The second most important research branch (after vegetation classification). Several PhD theses were elaborated. 22 dominant species were analysed based on 320 geobotanical relevés (not accessible anymore) and soil chemical features (pH, amount of organic matter, N, P, K, Cu, B, Mo) (some species relevant to dry grasslands)
Phenology		
Phenology of dominant species; timing of phenological phases in different regions of Latvia	Sabardina & Gurevich, 1952	Investigations were carried out in permanent plots for several years. Regional differences in beginning and duration of phenological phases were detected and described.
Vegetation geography		
Grassland plant communities (classification and distribution)	Sabardina, 1957; 1962	Description of 32 formations of grassland vegetation (according to the dominant method), Schematic distribution maps provided for three formations: *Seslerieta caeruleae*, *Avenastreta pubescentis*, and *Molinieta coeruleae*. Only a negligible part of dry grasslands included into this overview (formation class *Prata frigidissica*)
Mapping of grassland vegetation as a part of geobotanical mapping of Latvia	Sabardina et al., 1970	The mapping unit was a formation (according to the dominant method); the map is not published and not available for broader audience.
Mapping of semi-natural grassland habitats	Kabucis et al., 2003	The mapping unit was a habitat type (corresponds to association or alliance of the Braun-Blanquet vegetation classification approach) The map is digitised but not published, results are only partly published (Rusina, 2007).

References

Aleksandrova, V.D., 1969. *Vegetation classification*. Nauka, Leningrad, 275 pp. [Александрова В.Д. *Классификация растительности*. Наука, Ленинград. 275 стр.] (in Russian with English summary).

Eglite, Z.P. (1967) Distribution of the most typical mosses in relation to soil pH. *Proceedings of Academy of Sciences of Latvian SSR*, 4: 107-115. [Эглите З. П. Распространение наиболее типичных луговых мхов в зависимости от реакции почвы. *Известия АН ЛССР*, 4: 107-115.] (in Russian).

Fatare, I. (1966) Changes in productivity and botanical composition of grassland coenoses in relation to Cu. *Proceedings of Academy of Sciences of Latvian SSR*, 3: 48-57. [Фатаре И. Изменение урожая и ботани–ческого состава луговых ценозов под влиянием меди. *Известия АН ЛССР*, 3: 48-57.] (in Russian).

Fatare, I. (1967) Distribution of some grassland species in relation to contents of Cu in the soil. *Proceedings of Academy of Sciences of Latvian SSR*, 7: 104-113. [Фатаре И. Распространение отдельных видов луговых растений в зависимости от содержания в почве меди. *Известия АН ЛССР*, 7: 104-113.] (in Russian).

Jukna, J. (1964) Changes in yield and botanical composition of semi-natural grassland in relation to Mo. In: *Vegetation of Latvian SSR*. Latvian Academy of Sciences Press, Riga, Vol. 4: 241-258. [Юкна Я. Изменение урожая и ботанического состава естественого луга под влиянием молибдена. В кн. *Растительность Латвийской ССР*, изд. АН ЛССР, Рига, 4: 241-258.] (in Russian).

Jukna, J. (1966) Provision of different grassland type soils with Mo in the Latvian SSR. *Proceedings of Academy of Sciences of Latvian SSR*, 10: 63-70. [Юкна Я. Обеспеченность почв различных типов лугов Латвийской ССР молибденом. *Известия АН ЛССР*, 10: 63-70.] (in Russian).

Jukna, J. (1967) *Research of formation of semi-natural grassland vegetation structure in relation to Mo with the aim to improve the nutritive quality of sward. Dissertation.* Riga, 296 pp. [Юкна Я. *Изучение формирования структуры фитоценоза естес–твенных лугов под влиянием молибдена в целях улучшения кормового качества травостоя*. Диссертация на соискание ученой степени канди–дата биологических наук. Рига, 296 стр.] (in Russian).

Kabucis, I., Rūsiņa, S., Veen, P. (2003) *Grasslands of Latvia. Status and conservation of semi-natural grasslands. European Grasslands. Report Nr.6.* Royal Dutch Society for Nature Conservation, Latvian Fund for Nature, 46 pp.

Kļaviņa, Dz., Adamovičs, A., Straupe, I. (2001) Biodiversity of flora and the possible utilization of meadows in Tervete Nature Park. *Acta Biologica Universitatis Daugavpilensis*, 1 (2): 110- 112.

Klavina, G. (1965) Changes in yield and botanical composition of semi-natural grassland under influence of additional boron. *Proceedings of Academy of Sciences of Latvian SSR*, 12: 59-66. [Клявиня Г. Изменение урожая и ботанического состава естественного луга под влиянием бора. *Известия АН ЛССР*, 12, 59-66] (in Russian).

Dry pasture in Latvia, 2006. Photo: S. Rūsiņa.

Kļaviņa, G. (1966) Bora ietekme uz *Phleum pratense* L. augšanu un attīstības izmaiņām pļavas fitocenozē. [The influence of B on the growth and development changes of Phleum pratense in a grassland phytocoenosis.] *LPSR ZA Vēstis*, 9: 69-83. (in Latvian).

Klavina, G. (1967) *Dynamics of the growth and development of main components of grassland coenosis under the influence of additional boron. Dissertation.* Riga, 204 pp. [Клявиня Г. *Динамика роста и развития основных компонентов лугового фитоценоза под влиянием бора.* Диссертация на соискание ученой степени кандидата биологических наук. Рига, 204 стр.] (in Russian).

Konrāds, P. (1939) *Lielupes pļavu ražība un to uzlabošanas iespējas.* [Productivity of Lielupe's meadows and their improvement possibilities.] Izvilkums no Latvijas Agronomu biedrības izdevuma „Lauku darbs un zinātne", Rīga, 61 lpp. (in Latvian).

Konrāds, P. (1948) Zemgales pārplūstošās pļavas un to ražības celšana. [Zemgale's flood plain grasslands and their improvement.] *LPSR ZA Vēstis*, 11, 41-75. (in Latvian).

Kristkalne, S.H. (1955) Ecological-biological peculiarities of some wild growing grasses and possibilities of their economical use. In: *Vegetation of Latvian SSR.* Academy of Sciences Press, Riga, 1, 71-84. [Кристкалне С.Х. Эколого-биологические особенности некоторых видов дикорастущих кормовых трав и возможности их хозяйственного использования. В кн. *Растительность Латвийской ССР*, изд. АН ЛССР, Рига, 1, 71-84.] (in Russian).

Mirkin, B.M., Naumova, L.G., Solomesch, A.I. (2002) *Modern science of vegetation.* Logos, Moscow, 263 p. [Миркин Б.М., Наумова Л.Г., Соломещ А.И. *Современная наука о растительности*. Москва, Логос. 263 стр.] (in Russian).

Mirkin, B.M., Shelyag-Sosonko, Y.R. (1984) Classification of meadow vegetation in the USSR. *Vegetatio*, 56: 167-176.

Rabotnov, T.A., 1983. *Phytocoenology*. Moscow University Press, Moskow, 296 pp. [Работнов Т.А. *Фитоценология*. 2-е изд., Москва, Изд-во Московского Университета.] (in Russian).

Sabardina, G. (1949) Rīgas-Jelgavas līdzenuma dabīgās pļavas. [Semi-natural grasslands of the Rīga-Jelgava Lowland.] *Latvijas PSR ZA Vēstis*, 3: 69-84. (in Latvian).

Sabardina, G. (1952a) Semi-natural grasslands of the north-western part of the Lubana Lake.] *Zootehnikas un Zoohigienas Institūta Raksti*, 2: 43-56. [Сабардина Г. Естественные луга северо-западного берега Лубанского озера. *Zootehnikas un Zoohigienas Institūta Raksti*, 2: 43-56.] (in Russian).

Sabardina, G. (1952b) Grasslands in the middle part of the Abuls River. *Zootehnikas un Zoohigienas Institūta Raksti*, 1: 104-150. [Сабардина Г. Луга бассейна реки Абулс в среднем ее течении. *Zootehnikas un Zoohigienas Institūta Raksti*, 1: 104-150]. (in Russian).

Sabardina, G. (1952c) Semi-natural grasslands in the lower part of the Venta River *Zootehnikas un Zoohigienas Institūta Raksti*, 1: 68-103. [Сабардина Г. Естественные луга в районе нижнего течения реки Венты. *Zootehnikas un Zoohigienas Institūta Raksti*, 1: 68-103.] (in Russian).

Sabardina, G. (1955) Productivity of semi-natural grasslands in the Latvian SSR. In: *Vegetation of Latvian SSR*. Latvian Academy of Sciences Press, Riga, 1: 5-69. [Сабардина Г. Урожайность естественных лугов Латвийской ССР. В кн. *Растительность Латвийской ССР*, изд. АН ЛССР, Рига, 1: 5-69.] (in Russian).

Sabardina, G. (1957) *Grassland vegetation of the Latvian SSR.* Latvian Academy of Sciences Press, Riga, 303 pp. [Сабардина Г.С. *Луговая растительность Латвийской ССР*. Изд. АН ЛССР, Рига. 303 стр.] (in Russian).

Sabardina, G. (1958) *Latvijas PSR dabisko zālāju klasifikācija.* [Classification of Latvian semi-natural grasslands.] LPSR ZA izdevniecība, Rīga. 38 pp. (in Latvian).

Sabardina, G. (1962) Ecological-phytocoenological classification of Sesleria caerulea grasslands. In: *Geobotanical research of grasslands. Collection of botanical works.* Vol.4., Byelorussian Academy of Sciences Press, Minsk, p. 21-28. [Сабардина Г. Эколого-фитоценологическая классификация сеслериевых лугов. В кн. *Геоботаническое изучение лугов. Сборник ботанических работ*, вып. 4, изд. АН Белорусской ССР, Минск, 21-28. стр.] (in Russian).

Sabardina, G. (1964) Distribution of some wild grasslands species in relation to contents of P and K in soil. In: *Vegetation of Latvian SSR.* Latvian Academy of Sciences Press, Riga, Vol. 4: 223-240. [Сабардина Г. Распространение некоторых видов дикорастущих луговых растений в зависимости от содержания фосфора и калия в почве. В кн. *Растительность Латвийской ССР*, изд. АН ЛССР, Рига, 4: 223-240.] (in Russian).

Sabardina, G. (1968) Vegetation of islands – the place of mass nesting of ducks in the Engure Lake. In: *Ecology of water birds in Latvia.* Riga, p. 45-69. [Сабардина Г. Растительность островов – мест массового гнездования уток на озере Энгурес. В кн. *Экология водоплавающих птиц Латвии.* Рига, 45-69. стр.] (in Russian).

Sabardina, G., Fatare, I., Eglite, Z., Jukna, J. (1971) Estimating of indicator pottential of some grasslands species for indicating soil chemical properties. In: T*heoretical questions of phytoindication.* Nauka, Leningrad, p. 50-55. [Сабардина Г., Фатаре И., Эглите З., Юкна Я. Выявление индикационного значения отдельных видов луговых растений как показатель химизма почвы. В кн. *Теоретические вопросы фитоиндикации.* Наука, Ленинград, 50-55. стр.] (in Russian).

Sabardina, G., Fatare, I., Jukna, J. (1973) Ecological characteristic of some grasslands species of the Latvian SSR. In: *Problems of biogeocoenology, geobotany and botanical geography*. Nauka, Leningrad, p. 227-240. [Сабардина Г., Фатаре И., Юкна Я. Экологическая характеристика отдельных видов луговых растений Латвийской ССР. В кн. *Проблемы биогеоценологии, геоботаники и ботанической географии.* Наука, Ленинград, 227-240. стр.] (in Russian).

Sabardina, G., Gurevich, T. (1952) Phenological observations in semi-natural grasslands in the Latvian SSR. *Proceedings of Academy of Sciences of Latvian SSR*, 6: 33-52. [Сабардина Г., Гуревич Т. Фенологические наблюдения на естественных лугах Латвийской ССР. *Известия АН ЛССР,* 6: 33-52.] (in Russian).

Sabardina, G., Jukna, J. (1960) Dažu savvaļas pļavu augu izplatība atkarībā no augsnes pH. [Distribution of some wild grassland plants in relation to the soil pH.] Gr. *Latvijas PSR veģetācija*, 3: 69-80 (in Latvian).

Sabardina, G., Jukna, J. (1968) Distribution and abundance of grassland species in relation to different contents of Mo in soils. *Proceedings of Academy of Sciences of Latvian SSR*, 6: 60-70. [Сабардина Г., Юкна Я. Распространение и участие в травостое видов луговых растений на почвах с различным содержанием молибдена. [*Известия АН ЛССР*, 6: 60-70.] (in Russian).

Sabardina, G., Klavina, G., Fatare, I. (1967) Quantitative comparison of vertical structure of coenosis. *Proceedings of Academy of Sciences of Latvian SSR*, 12: 58-61. [Сабардина Г., Клявиня Г., Фатаре И. Количественное сравнение вертикального сложения фитоценоза. *Известия АН ЛССР,* 12: 58-61.] (in Russian).

Sabardina, G., Tabaka, L.V., Klavina, G.B., Fatare, I.J., Jukna, J.J., Birkmane, E.J., Eglite, Z.P., Vielichko, E.B., Schmit, I.J. (1970) *Geobotanical microdivisioning as a part of scientific basis for nature-territorial planning for 1967-1970. Report No. 117.* [Сабардина Г.С. , Табака Л.В., Клявиня Г.Б., Фатаре И. Я., Юкна Я.Я., Биркмане Е.Я., Эглите З.П., Виеличко Е.Б., Шмит И.Я. *Геоботаническое микрорайонирование, как составная часть научной основы Природно-территориального Планирования за 1967-1970 гг.* Отчёт по теме 117.] (in Russian).

Sabardina, G., Vielichko, E. (1970) Using of ecological profile for research of spatial distribution of vegetation. *Proceedings of Academy of Sciences of Latvian SSR*, 5: 12-19. [Сабардина Г., Виеличко Е. Использование экологического профиля в изучении пространственного размещения растительности. *Известия АН ЛССР*, 5: 12-19.] (in Russian).

Shalajeva, T.V., Sabardina, G.S. (1971) Radioecological characteristic of the main components of meadow and pasture vegetation in the Latvian SSR. *Proceedings of Academy of Sciences of Latvian SSR*, 11: 41-46. [Шалаева Т. В., Сабардина Г.С. Радиоэкологическая характеристика основных компонен–тов растительного покрова лугов и пастбищ Лат–вийской ССР. *Известия АН ЛССР*, 11: 41-46.] (in Russian).

Tērauds, V. (1954) *Dabisko pļavu un ganību ražības celšanas iespējas un veidi Latvijas PSR.* [Possibilities and types of improvement of semi-natural meadows and pastures in Latvia.] Rīga. 20 pp. (in Latvian).

Vārsbergs, J. (1923) *Pļavas un ganības.* [Meadows and pastures.] Rīgā. 79 lpp.

Nature protection area „Randu Meadows" with extensive coastal grasslands, 2006. Photo: S. Rūsiņa.