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CONNECTION BETWEEN STAND PATTERN AND THE ORGANIC-MATTER PRODUCTION IN THE MARSHLANDS OF THE INUNDATION AREA AT KÖRTVÉLYES

GY. BODROGKÖZY and I. HORVÁTH
Department of Botany, Attila József University
Szeged
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Introduction

The meadow communities of inundation areas, as a result of the flood waves in the major rivers, considerably differ from other meadow associations of hygrophilous type. This concerns both the species-composition and the organic-matter production. The meadow associations of inundation areas are poorer in species, the participation of the accompanying species in covering is very low.

Making use of three plant communities in the inundation area of the Tisza at Körtvélyes, we have dealt with the problem of connection between stand pattern and the organic-matter production in case of these highly homogeneous associations (HORVÁTH—BODROGKÖZY 1972).

The upper zone was formed by a typical flood-plain marsh-meadow, *Agrosti-Alopecuretum* Soó (33) 47, resp. its sub-association *Agropyron repens* (BODROGKÖZY, 1962). The middle zone is *Caricetum gracilis* (GRÄBNER et HUECK 31) Tx 37, about 15—25 cm lower than the former one and therefore water-covered for a longer time after the flood had passed. The lower, third zone had a *Baldingeretum arundinaceae* stand being water-covered for the longest period (BODROGKÖZY 1965, 1967).

Materials and Methods

The three plant communities investigated have a zonal arrangement.

The soil of all the three communities is a young alluvial soil. The low organic-matter content and the approximately 10 per cent value of the total salt content of the lower layers approach the criterion of faintly saline soils. Most part of the root-mass of glycophilous species takes place in the upper 5 cm soil layer under conditions like this.

The investigation was carried out in 1972. We sampled from the unmown zone of all the three plant communities on three occasions in the growing season (June 3rd, September 6th, October 13th). Sampling took place with "harvest" method, from a 16 sq.dm area, in 3 to 5 repetitions.

The root-mass was determined with wet washout from a monolith of 1 sq.dm surface excavated till a depth of 20 cm. The root-masses falling into 0 to 5, 5 to 10, and 10 to 20 cm layers were determined separately. The phytomass over the surface was divided into living and dead matter, and the living part into species, and the fresh and dry weighs were recorded (even in case of the roots washed out of the three soil layers). Till a depth of 60 cm, we have determined the water-content of soil, as well, in every ten cm.

As to the climatic factors, they did not deviate considerably from the "average". We don't go in for discussing these, therefore, as the aim of our investigation has been to analyse the connection between stand pattern and the organic-matter production.

In the year 1972, there was no flood wave to be observed.

The values of the coenological recordings are given in percentage.

Description and discussion of results

Upper zone

The community is a double-level forming marshland speargrass *(Agrosti-Alopecuretum* Soó (33) 47 *agropyretosum.*

In the spring aspect, the layer of tall-grasse is predominated by *Alopecurus pratensis, Agropyron repens.* There occur, by blades, *Lythrum salicaria, L. virgatum, Chrysanthemum elatum, Symphytum officinale,* as well.

The lower herb layer is rather poor; it is formed by *Potentilla reptans, Ranunculus repens, Mentha arvensis.* It takes, however, part in the total covering of both layers in hardly 15 per cent.

As a result of the favourable soil-moisture, the water-content was in the upper 10 cm soil layer 24 ml/cubic decimetre in June, 31 ml/c. dm in September. The closed character of the stand was intensifying, the number of species was, however, decreasing and in the course of the growing season from among these two predominating species the *Agropyron repens* came into prominence.

Middlezone

Following the relief areas of the same altitude, the scabrid-sedgy stand of *Caricetum gracilis* (GRÖBNER et HUECK 31) Tx 37 *alopecuretosum* manifests itself in zigzags or forming some spots. It is formed mainly by hygrophilous species, in spite of the fact that in June of the floodless year of investigation the moisture-content of the upper 10 cm of the soil was hardly differring from the values measured in the *Agrosti-Alopecurem.*

The sedge species *(Carex gracilis C. melanostachya, C. hirta)* represented on average 78 per cent of the total covering. After them *Glycyrrhisa echinata* and *Potentilla reptans* followed.

In the spring aspect, the density of the stand in the upper zone is higher: 50 per cent. At the end of Summer, as a result of the Agrostion species being pressed back, the stand-density is somewhat decreased (45 per cent). The participation of *Glycyrrhisa echinata* increased, however, a little, reaching 35 per cent.

At the end of the growing season, the *Carex*-species became nearly predominating. The density of the stand has decreased, its total covering is 30 per cent, the total participation of the *Agrostion* species is hardly 7 per cent. (We notice that the disappearance of *Glycyrrhiza echinata* from the station may be explained by some sampling blunder.)

Lower zone

The deepest areas of the flood-plain are populated partly by *Baldingeretum arundinaceae* Soó 47, partly by *Glycerietum maximae* HUECK 31 stands. The *Baldingera* stand, selected for being investigated, is, in regard of its stand-composition, poor in species. In addition to the name-giving species, there only occur in *Carex gracilis, Lythrum salicaria, Eleocharis palustris.* The density of the stand is coming close to that of the previous two coenoses (40 to 45 per cent). In the spring aspect, the

participation of *Baldingera* and *Carex gracilis* in covering was 89 per cent, that of *Lythrum salicaria* was 4 per cent. The participation of the other species, appearing mainly by blades, was 3 per cent.
In that season, the soil-moisture was in the upper 10 cm less than in the drier zones (21 ml/cubic decimetre). The explanation of that is the more intensive evaporation, as the volume of phytomass is about double the previous ones.

At the end of Summer, the density of stand decreased here, as well; *Baldingera,* with its green mass, oppressed the species of the lower layer.

The organic-matter production of stands

The dry weight above soil surface was the highest in case of the Baldingeretum arundinaceae association at all the three samplings and the least organic matter was produced by *Caricetum gracilis-nutantis alopecuretosum.* In case of the *Baldingera* stand, the amount of organic matter increased from June to October, achieving its maximum at the October investigation. In case of *Agrosti-Alopecuretum agropyretosum,* the maximum was measured in September, and for October the quantity of dry matter diminished to a lesser extent. The production of the *Carex*-association did not change between samplings in September and October (Tables 1, 2, 3).

Table 1. *Agrosti-Alopecuretum agropyretosum*

Species	June		September		October	
	dry weight (g/sq · m)	cover p · c	dry weight (g/sq · m)	cover p · c	dry weight (g/sq · m)	cover p · c
	above ground level					
Alopecurus + Agropyron	279,6	33	112,7	35	97,0	35
Lythrum species	6,6	1	35,7	4	—	—
Other species	37,0	6	54,6	6	12,8	5
Total living	323,2	40	203,0	45	109,8	40
Dead	55,2	—	358,2	—	404,4	—
Total	378,4	40	561,2	45	514,2	40
	below ground level					
0—5 cm	1705	—	1550	—	—	—
5—10 cm	220	—	1280	—	—	—
10—20 cm	285	—	885	—	—	—
Total	2210	—	3715	—	—	—
Altogether	2588,4	40	4276,2	45	—	40

The rate of participation of the living parts in the phytomass above the surface — in case of all the three plant-stands — changed in a similar way during the growing season. It considerably decreased, therefore, from the 85—95 per cent in June to 14—21 per cent in October. (Fig. 1)

The phytomass below the ground-level is very high at both associations (Tables 1, 2, and 3). It is to be established, moreover, that the proportion of the dry matter,

above and below the ground-level, shifts, in case of the *Carietum* and *Baldingere* stands, towards the parts lying above the ground-level till the end of Summer, while in case of the third association, in a small degree, a change in opposite direction may be observed.

Table 2. *Caricetum gracilis-nutantis alopecuretosum*

Combination	June		September		October	
	dry weight (g/sq · m)	cover p · c	dry weight (g/sq · m)	cover p · c	dry weight (g/sq · m)	cover p · c
	above ground level					
Carex species	263,8	38	103,1	30	65,5	28
Glycirrhisa	11,1	5	80,2	14	—	—
Other species	45,8	7	37,2	1	0,8	2
Total living	320,7	50	220,5	45	66,3	30
Dead	14,9	—	189,5	—	350,4	—
Total	335,6	50	410,0	45	416,7	30
	below ground level					
0—5 cm	2400	—	1555	—	—	—
5—10 cm	555	—	735	—	—	—
10—20 cm	230	—	395	—	—	—
Total	3185	—	2685	—	—	—
Altogether	3520,6	50	3095,0	45	—	30

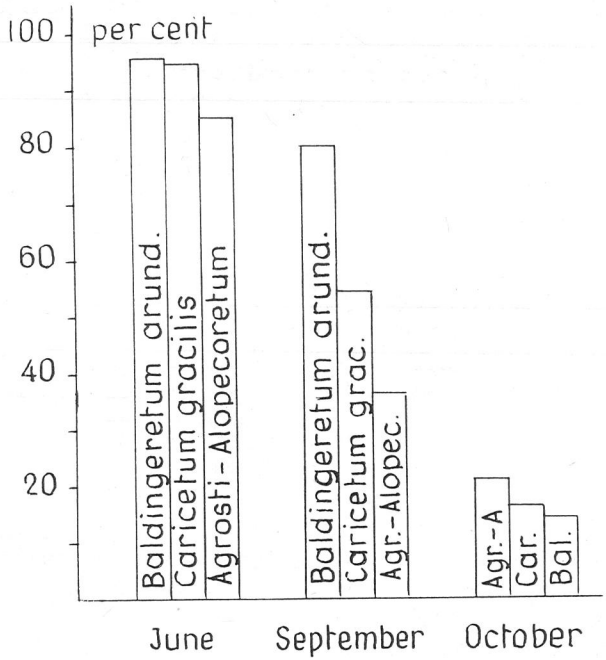

Fig. 1. Participation of living parts in the dry-matter production.

Most part (in June 76—83 per cent, in September 66—73 per cent) of the phytomass was contained in the upper 10 cm soil layer. In case of the stand of *Agrosti-Alopecuretum agropyretosum* and *Caricetum gracilis-nutantis alopecuretosum,* the phytomass content of the uppermost 5 cm soil layer is particularly high (65—68 per

Table 3. *Baldingeretum arundinaceae*

Combination	June		September		October	
	dry weight (g/sq · m)	cover p · c	dry weight (g/sq · m)	cover p · c	dry weight (g/sq · m)	cover p · c
	above ground level					
Baldingera and *Carex*	508,4	40	564,9	38	130,7	35
Lythrum	26,0	4	17,2	1	—	—
Other species	10,6	1	21,7	1	—	—
Total living	545,0	45	603,8	40	130,7	35
Dead	22,20	—	105,5	—	794,1	—
Total	567,20	45	754,3	40	924,8	35
	below ground level					
0—5 cm	1345	—	1330,0	—	—	—
5—10 cm	1245	—	1255	—	—	—
10—20 cm	230	—	425	—	—	—
Total	2820	—	3010	—	—	—
Altogether	3387,2	45	3764,3	40	—	35

cent) in June. Till Sptember — at the expense of the upper layers — at the 10—20 cm ground-level the proportion of dry matter increased. The participation of the dominant species in the cover is summarized in Table 7, and their connection with the phytomass above the soil is illustrated in Fig. 2.

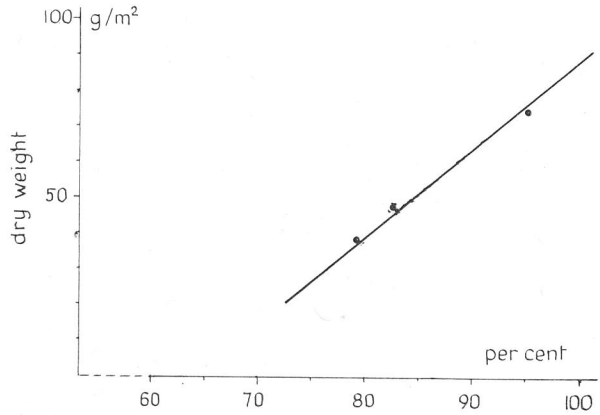

Fig. 2. Participation of dominant species in the cover.

The close linear connection between the phytomass above the soil and the "stand pattern" is proved by that the participation pro rata of the dominant species, that is to say, a more homogeneous vegetable stand, — in case of an approximately identical close state and height — coincides with a larger dry-matter quantity. It seems to be connected with allelopathic effects, as well (antagonistic effects between the species).

Table 4. *Participation of the dominant species in cover*

per cent

Species	June	September	October	Mean
Alopecurus and *Agropyron*	83	78	86	82
Carex species	76	67	93	78
Baldingera	89	95	100	95

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