

Institute of Plant Biology of the Technical University of Braunschweig Working Group for Vegetation Ecology and Experimental Plant Sociology

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Research

Vegetation of urban habitats, roads and railways

Flora and vegetation of settlements are investigated in subject to their size, age and geographical position. As a centre of the ruderal vegetation walls and ruins are studied throughout Europe with particular emphasis on Brunswick as a model. The vegetation of the young city of Wolfsburg was studied in detail.

Roads and railways are important linear structures for plant species. The migration of *Atriplex micrantha*, *A. sagittata* and *A. oblongifolia* along motorways and the spreading of *Senecio inaequidens* to the east were investigated. The vegetation ecology of nuptiphytic species is closely related to the vegetation of settlements. Competitive experiments on selected species use different levels of nitrogen and electrolytes.

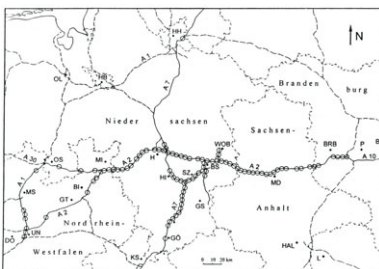


Fig. 1: *Atriplex micrantha* along northern motorways.

Fig. 2: Flora along the roads as part of the regional species pool on Majorca.

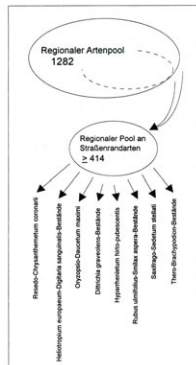
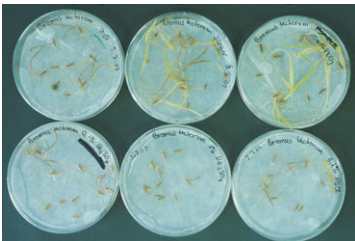


Fig. 3: Germination experiments on *Bromus tectorum* with different levels of nitrogen and electrolytes.



Alien plants

Alien plants are of particular interest and frequently discussed. Often they seem to be threatening but the most problematic aliens are the wooden species *Robinia pseudacacia* and *Prunus serotina* and seven highly competitive ornamental plants, which are important in the lower elevations of the low mountain ranges and along rivers coming from the mountains: *Fallopia japonica*, *Fallopia sachalinensis*, *Helianthus tuberosus*, *Heraclenum mantegazzianum*, *Impatiens glandulifera*, *Solidago canadensis* and *Solidago gigantea*.

During the last 20 years a system of long-term monitoring was set up to study and quantify the spreading, niches and adverse effects to the natural vegetation. The monitoring is working for instance in the city of Brunswick, the landscape north of the Harz mountains, the river Elbe and the system of the river Weser, Monte Baldo (Italy), rivers on Rhodes, Corfu, Malta, Majorca, La Palma and Fuerteventura.

The long-term monitoring plots deal with lots of different habitats such as flat roofs, buildings, streets, Botanical Gardens, parks, cemeteries, railways, the harbour, the edge of motorways, river banks and the edge of woods.



Fig. 4: *Nicotiana glauca*, a common alien species on Fuerteventura, left: flowering plant at the age of one (Botanical Gardens Brunswick), above: in the desiccated reservoir of Vega de Rio Palmas.

Floodplains

The floodplain of the river Elbe is the most interesting floodplain in Central Europe. The vegetation is investigated intensively. A particular focus is on the different riparian structures as well as on the migration of species along rivers.

In addition the vegetation of alpine rivers, the phytodiversity of torrents on Majorca and Rhodes, the flora and vegetation of the barrancos on La Palma and the flora of episodically rivers on Fuerteventura is studied.

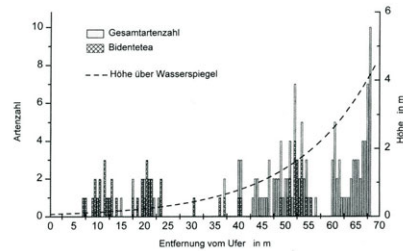


Fig. 5: Transect through the groyne field upstream to the shipping pier of Pevestorf (Lkr. Lüchow-Dannenberg).

Art	Anzahl an Bidentetea	Stängell (%)
Atriplex micrantha (D)	10	100
Chenopodium glaucum	11	100
Chenopodium album	11	100
Chenopodium poliflorum	11	100
Fallopia japonica	11	100
Atriplex micrantha	10	90,9
Solidago canadensis (D)	10	90,9
Rubus saxatilis	9	81,8
Prunella vulgaris	9	72,7
Chenopodium foliosum	8	72,7
Rubus saxatilis	7	63,6
Rubus saxatilis	7	63,6
Congium strictum	6	54,5
Elymus repens (D)	6	54,5
Amaranthus retrofractus (D)	5	45,5
Elymus repens (D)	5	45,5
Polygonum vulgare	4	36,4
Galium aparine	4	36,4
Chenopodium poliflorum	4	36,4
Elymus repens (D)	4	36,4
Prunella vulgaris	4	36,4
Polygonum bistorta	3	27,3
Prunella vulgaris	3	27,3
Galium aparine (D)	3	27,3
Galium aparine (D)	2	18,2
Galium aparine (D)	2	18,2
Prunella vulgaris (D)	1	9,1
Prunella vulgaris (D)	1	9,1

Tab. 1: Frequency of Bidentetea-species in 11 groyne fields between Magdeburg and Lenzen.



Fig. 6: Floodplain on Rhodes with *Nerium oleander* (Oleander).

Islands and isolated habitats

While flora and vegetation of Fuerteventura is investigated as a model of an island, calcareous grasslands, inland salt marshes and woods are interesting because of their isolation to each other. They are situated in the agrarian landscape which is intensively used. Therefore these habitats are similar to islands because of missing networks.

The research is done on phytodiversity, vegetation and similarities. The area north of the Harz Mountains is characterized by an interesting gradient from subatlantic climate in the western part to sub continental climate in the eastern part. The analysis of the floristical data obviously divides the investigated plots into two groups: The continentally influenced (eastern) steppes containing a high number of xerothermic relicts, and the western grasslands, which are characterized by subatlantic-submediterranean species, whereas the pontic-pannonic species are missing completely. The composition of these groups is independent from the method of comparison. Classification based on the complete floristical data, or only considering the biogeographically important species, or the floristic-statistical approach give almost identical results.

The isolation is also investigated on the level of species. A diploma thesis is dealing with the populations of *Eryngium campestre* from locations of the river Oder in the east up to the river Rhine in the west by using RAPDs and AFLPs.

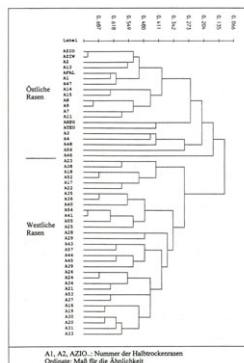


Fig. 7: Cluster analysis of the similarity index using complete linkage.



Fig. 8: *Eryngium campestre*.

Concerning the results of the research on woods it is highly interesting that the woody species occur immediately in new forests but the characteristic herbaceous species need more than 800 years for invading. In consequence ancient woods should strongly be protected.