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F. Summary

The nitrogen relations and other ecological investigations on wet fertilised meadows

Section A—*Systematics*

The present sociological nomenclature was examined. The wet fertilised meadows investigated are described as the associations *Polygono-Cirsietum oleracei* (TÜXEN and PREISING, 1951) and *Bromo-Senecionetum.* There appears to be an edaphic difference between the two associations. Both are subdivided by some authors. For experimental purposes it was considered more meaningful to regard the wet fertilised meadows as a single group: the *Cirsietum oleracei medioeuropaeum.*

An ordination of vegetation tables revealed that the *Cirsietum* was not clearly distinct from the wetter forms of the *Arrhenatheretum.* There were also montane varieties of the community, but it is probably better to regard these simply as variants of the community. The subdivision of the *Molinio-Arrhenatheretea* is clearly too artificial. Probably in nature a multidimensional continuum exists, the named associations are representing parts of the continuum which are distinguishable floristically.

The distribution of the *Cirsietum oleracei medioeuropaeum* was considered. It seemed to be of subatlantic origin, and the present distribution must be correlated with management practices. Various facets of the physiognomy of the community were described.

Section B—*Soil factors*

Three experimental areas were selected, i.e. (a) Swiss Midlands, (b) Alsace, (c) Baden-Württemberg. These offered contrasting soil conditions.

The two major controlling factors were water and nitrogen. Ground water and soil moisture content were examined, and the latter was correlated with the soil water tension. Studies of the "available water" by determining the yearly variations in suction force showed that water was rarely a limiting factor.

The nitrogen relations were studied by measuring the seasonal pattern of nitrate- and ammonium-contents in the field and by measuring the seasonal pattern of potential and actual nitrification. There were similarities in the patterns of both potential and actual nitrification in the three areas, although they were modified locally in response to climate.

Various factors affecting the nitrogen budget were investigated in the laboratory, e.g. aeration, water content, calcium carbonate content, ammonium supply and the distribution of nitrifying activity horizontally and vertically in the soil. Populations of the nitrifying bacteria (nitrite and nitrate producers) were cultured and the fluctuations in the population size was related to the pattern of nitrification. These experiments were discussed in relation to the nitrogen budget of the community, and it appeared that along with water, nitrogen was a major factor controlling the stability of the community.

Soil phosphorus was also determined and the content showed a characteristic seasonal pattern as did pH and water content. Phosphorus may be a factor likely to cause the differentiation into some vegetation variants.

Section C—*Productivity*

The productivity of the wet fertilised meadows was measured both quantitatively and qualitatively. From sample cuts the hay yield was estimated and the hay was fractionated into three portions important from the agricultural point of view: grasses, legumes and herbs. Protein and fibre contents were measured.

Since mineral nutrition was found to be important (Section B), the growth of several species, typical and constant of the community, was measured in sand culture. Their responses to varying levels of nitrogen, phosphorus and calcium were tested. The results were discussed in relation to the role played by these macronutrients in the light of the results in Section B.