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THE PART OF WATER VEGETATION IN EUTROPHICATION IN AN EXPERIMENTAL AREA AT THE KISKÖRE RIVER BARRAGE

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Abstract

The eutrophication of the areas inundated with water may quickly take place. In the area of the water-inundated flood-plain wood, the rise in the degree of trophity is indicated by a considerable multiplication of the filamentous algae developed on the decayed vegetable remains (biotectonic eutrophication), of the rooted (rhizobenthic eutrophication) and floating macrophytes (pleustonic eutrophication). Of the open-water area the high individual number of the members of phytoplankton (planktonic eutrophication) is characteristic.

Introduction

Beside the future Kisköre Reservoir an old flood-plain area, surrounded with a strong dam, has got under a lasting inundation. We have followed with attention the hydrobiological changes taking place in the area filled up with the water of the Tisza in various biotopes (BANCSI 1975, B. TÓTH 1975, B. TÓTH and VÉGVÁRI 1975, HAMAR 1975), paying a particular regard to the differences between the open water and the inundated woody area.

Material and method

On one side of the about 4 sq.km area (B. TÓTH and VÉGVÁRI 1975) a 50 to 100 m broad flood-plain wood is situated, consisting of *Salix fragilis* L. and sporadically containing *Populus alba* L. and *Populus tremula* L., as well. On the other side, a young stand of *Fraxinus pennsylvanica* MARSH. can be found, in a 5 to 10 m broad strip (Fig. 1).

In the present-day place of the open water an extinct dead arm was lying. The water of the wooded area became 1.5 m deep after being filled up, the maximum depth of the open water being 4 m. The experimental area was filled up with the water dammed by the Kisköre River Barrage, by means of pumps. The investigation lasted from Spring till Winter, in 1975.

Results

Following the filling, *Potentilla anserina* L. and *Euphorbia salicifolia* HOST. have remained in the shallow enough parts and there has begun also the diffusion of the water vegetation getting in with the filling water, and later on its local differentiation started, as well, owing to the different biotopes.

In the growing season, in the open water, a rare sub-association of *Nymphaetum albo-luteae* NOWINSKI *nymphaetosum* developed. The character species is *Nymphaea alba* L., the concomitant species are *Ceratophyllum demersum* L., and *Trapa natans* L. In the middle of the open water we have found some specimens of *Potamogeton lucens* L. (Fig. 1). The part of macrophytes is but a minimum in the open water, on the other hand, the phytoplankton has achieved a permanently high individual number (HAMAR 1975).

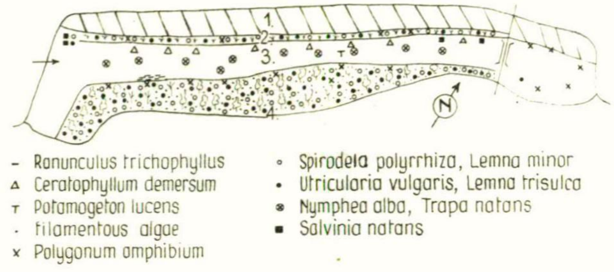

Fig. 1

Following the inundation, after the high phytoplankton individual number lasting in the wooded area but for a short time, the filamentous algae appearing on the subaquatic vegetable remains became dominant (*Spirogyra* spp., *Vaucheria* spp., *Cladophora* sp.). In the shallower parts, we have found the thalluses of the blue alga *Gloeotrichia natans* (HEDWIG) RABEN (Fig. 2) and those of *Hydrodictyon reticula-*

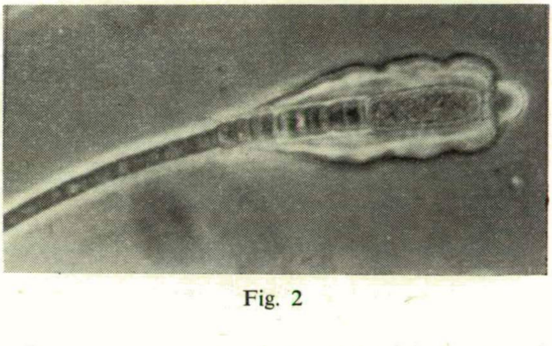

Fig. 2

tum TURNER. The alga grasses regressed parallel with the wood coming into leaf, giving place to macrophytes. The macrophytes with drawing to the wood have formed a pure *Lemno-Utricularietum spirodeletosum* Soó sub-association. Character species are at the water surface: *Spirodela polyrrhiza* (L.) SCHLEID., and *Lemna minor* L. From among the submersed species, the dense stands of *Utricularia vulgaris* L., and *Lemna trisulca* L. are characteristic (Fig. 1). From among the concomitant species, *Ceratophyllum demersum* L., and *Polygonum amphibium* were present. In Autumn, parallel with the destruction of the water vegetation, bacterial and algal grasses appeared (HAMAR 1975) (Fig. 3).

In the thicket, too, lying along the other side of the open water, the *Lemno-Utricularietum spirodeletosum* Soó sub-association developed (Fig. 4). The character species are similar to the former one. As a concomitant species, *Polygonum amphibium* L. occurred (Fig. 1).

In the shallow part between the wooded area and the open water, we have found the grass *Ranunculus trichophyllus* CHAIX.

Fig. 3

The area inundated became full of reed-grass in a comparatively short time, and this process is, of course, the most considerable in the water-covered flood-plain wood. The available nutritive material is of very large quantity (B. TÓTH—VÉGVÁRI 1975), it can be considered therefore as an ideal place for the hair-weed vegetation and filamentous algae.

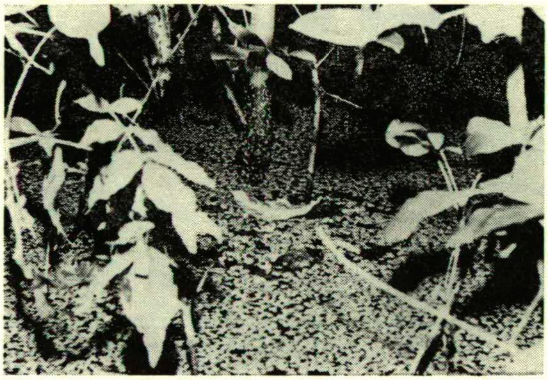

Fig. 4

After the flood-plain wood had got under water, as a result of foods washed from there, the rise in trophity was indicated first of all by the invasion of the phytoplankton multiplied quickly (HAMAR 1975).

In the growing period, the macrophytes began to dominate more and more, thus the accumulation of nutrients was realized in these, in contrast to the open water.

The infiltration of the nutritive materials enriched in the water may be manifold. It is always determined by the ecological situation, which group takes part, and to what extent, in the course of eutrophication. In our experimental area, in the open water, a considerable multiplication of the phytoplankton followed. Owing to the low number of macrophytes, we may speak of a process of *planktonic eutrophication.*

At flooding the wooded areas, the quickly-soluble nutritive materials were favourable to the phytoplankton (planktonic eutrophication), but only for a short time because, owing to the shading effect of the woody-bushy area and the smal water mass, the filamentous algae settled dow on the branches and tree-trunks, and later the macrophytes multiplied considerably.

In case of the filamentous algae we may speak of a *biotectonic eutrophication* (biotecton = the community of organisms living in bed-alien, subaquatic substrates, well-separable from the river-bed, being a member of the *benton* (LAKATOS 1975).

The nutrient-intake of the water macrophytes is different. The floating, rootless plants take in nutritive materials immediately from water *(pleustonic eutrophication)*, while the nutrient-intake of the rooted plants from water is carried out through some substrate *(rhizobenthic eutrophication)*.

The destruction of macrophytes may result in the release of a part of nutrients and the acceleration of filling in the ecosystem. The release of the nutritive materials — in however slow rhythm it takes place — may set in motion a recent cycle while the detritus accumulated may promote the settling down of recent macrophytes.

Depending on the way of the nutritive material, there are possible different types of eutrophication, namely:

plankton — planktonic eutrophication,
benton — biotectonic eutrophication,
rhizobenthic eutrophication,
pleuston — pleustonic eutrophication.

The nutrient infiltrating into the system can be used, on principle, by any vegetable group taking place in whichever niche.

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