Biological Aquatic Weeds Control, Watercourse, Egypt's

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Abstract: A concerted effort has been undertaken by various agencies within many of the industrialized countries of the world to manage aquatic macrophytes. Most of these efforts have been directed toward the control of adventive species in situations where they grow to nuisance proportions A variety of control techniques is available, and these include: herbicide treatment, biomass harvesting, nutrient diversion and chemical precipitation, dredging, drawdown, bottom sealing, use of biological control agents, and physical and chemical reductions in under water irradiance. Aquatic macrophytes play a key role in maintaining fish productivity, both by stimulating invertebrate production and by providing habitat diversity.

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Introduction

Nutrients supplied from sediments in combination with those in solution have been considered adequate to meet macrophyte nutritional demands even in oligotrophic systems.

It is generally accepted that rooted macrophytes can fulfill their P requirements by direct uptake from sediments studies have likewise demonstrated significant mobilization of N from sediments.

The role of sediment as a direct source of P and N for submersed macrophytes is ecologically quite significant, since these elements are normally very low in concentration in available form in the open water of aquatic systems.

The availability to submersed macrophytes of micronutrients in the open water of most aquatic systems is usually very low due to removal from solution by microorganisms and by precipitation and complexation. In contrast, micronutrients are relatively abundant in available (i.e., chemically reduced) form within most sediments. Submersed macrophytes can satisfy their requirements for micronutrients in addition to P and N by direct uptake from sediments.

Although some sediment may provide sufficient potassium (K) via root uptake for moderate growth of submersed macrophytes, experimental additions of K to solutions lacking in this element have been demonstrated to stimulate macrophyte growth on a variety of sediments.

Since ammonium and potassium ions have the same charge and nearly identical ionic radii, they may compete for cation exchange sites in sediments and on root surfaces. In this connection, the more effective uptake of N (as ammonium) than K from sediments suggests some degree of ion selectivity associated with nutrient uptake systems operating in roots. The open water rather than sediment appears to be the primary source of K supply to submersed macrophytes in most aquatic systems.

Calcium (Ca) can be mobilized from sediments by submersed macrophytes However, in the investigation of Huebert and sago pondweed failed to grow in the absence of Ca in solution, and growth of Eurasian water milfoil was markedly reduced in solutions low in Ca. For many species, Ca may be required in the open water due to its apparent involvement in bicarbonate utilization during photosynthesis.

Reduced growth of sago pondweed in Mg- free solutions suggests that Mg may also be required in the open water by some submersed macrophytes species.

Both shoot and root uptake of SO_4, Na, and Cl has been demonstrated for submersed macrophytes, considering the normal.

Seasonal changes in photoperiod and incident solar radiation promote corresponding changes in water temperature in most aquatic systems. Thus the influence of light on submersed macrophytes cannot be properly evaluated without also considering the influence of temperature. In controlled laboratory experiments, water temperature has been shown to interact with light in affecting submersed macrophytes growth and morphology photosynthesis, chlorophyll composition and reproduction

Higher temperatures within ranges of thermal tolerance generally promote greater chlorophyll concentration and productivity, with concomitant increases in both shoot length and shoot number;

increasing temperature and increasing light appear to elicit opposing responses in shoot length.

The thermal optimum for many submersed freshwater macrophytes appears to be rather high, in the range of 28 to 32 C.

High concentrations of soluble reduced iron and manganese in sediments are normally considered toxic to plants. High soluble iron concentrations can inhibit the growth of vegetation by interfering with sulfur metabolism or by limiting the availability of phosphorus.

Organic compounds in both sediment and water have been demonstrated to reduce the growth pf submersed aquatic vegetation in the laboratory and in the field. In addition, high concentrations of sediment organic matter appear to decrease the growth rate of submersed macrophytes indirectly by decreasing mineral nutrient densities. It has been suggested that increasing concentrations of organic matter in sediments may contribute to the general decline of submersed macrophytes

Inorganic Carbon:

Free carbon dioxide (CO_2) is generally considered to be the carbon form preferred in photosynthesis by submersed freshwater macrophysics. However, in the majority of freshwater systems the largest fraction of inorganic carbon exists in the form of bicarbonate (HCO3) ions.

Different submersed freshwater macrophyte species vary in their abilities to utilize HCO3 in photosynthesis.

In low alkalinity, low carbon environments the formation of four carbon (C-4) acids during photosynthesis of some macrophyte species (e.g., hydrilla) appears to be adaptive, and is associated with a low level of photorespiration.

Management of Aquatic Weeds in Egypt

Manual Control

Manual control was practiced for Egyptian canals and drains of bed width and water depth less than 4 m and 1.5 m, respectively. Since 1985, the use of this method was decreased and replaced gradually by mechanical control. In 1995, a new project was started to clean and maintain small Egyptian canals (bed width less than 2m) by using developed manual tools. The results of applying this project, in Upper Egypt and Delta, were suitable to apply it on a large scale. This method is active because it cleans the canal without any damage for the cross section.

Mechanical Control

Aquatic weeds control in Egyptian channels by dredging or cutting them, depend upon the efficiency of the used machine. Most machines are operated from the banks such as hydraulic excavators. Mowing boats are developed to control submerged and emergent weeds in channels more than 8 m wide and the water depth is deep enough for operation. Harvesters were also used to control aquatic weeds. Mowing buckets, fixed on four wheel drive tractor, were used to control weeds for channels of width less than 5 m.

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