

ENV Report 28 - *Effects of Sediment Resuspension and Deposition on Plant Growth and Reproduction* by Robert Doyle

ABSTRACT

This report summarizes a series of controlled experiments designed to investigate the impacts of suspended inorganic turbidity on the growth and reproductive potential of two submersed macrophytes of importance to the Upper Mississippi River System. Experiments were conducted on vallisneria (*Vallisneria americana*) and sago pondweed (*Potamogeton pectinatus*). Separate controlled experiments addressed the impacts of turbidity on mature plants, recently-sprouted tuberlings, and recently-germinated seedlings (vallisneria only).

Turbidity significantly depressed the continued vegetative growth of mature vallisneria. As turbidity increased, vallisneria plants produced fewer daughter plants and accumulated less biomass. In fact, the most turbid conditions (continuous exposure to 30 NTU) prevented the plants from producing new daughter plants, and decreased total plant mass. In addition, vallisneria tuber and flower production were reduced under turbid conditions.

Turbidity also impacted the vegetative growth and reproductive capacity of sago pondweed, although the magnitude of the effect was less than for vallisneria. Total mass produced declined as light levels dropped due to increasing turbidity. As turbidity increased, so did the shoot:root mass ratio of the plants. Apparently, under turbid conditions, the plants had to invest proportionally greater amounts of energy in light-acquiring tissues, and produced fewer roots. In terms of reproductive potential, turbidity negatively affected tuber production but did not impact flower production.

Turbidity had a much stronger effect on recently-sprouted tuberlings of vallisneria than of sago pondweed. Sago pondweed tubers showed 100% survival under all turbidity treatments, and produced similar numbers of stems under all treatments. Total mass per tank was also not significantly different among turbidity treatments. Turbidity did influence vallisneria tuber survival and growth, especially for the smaller tubers. Small tubers showed very low survival (<20%) under the highest turbidity but survival increased to > 60% with decreased turbidity. The number of rosettes produced by a single vallisneria tuber was negatively affected by turbidity.

Finally, vallisneria seedlings were profoundly negatively influenced by turbidity. Under turbid conditions, seedlings had higher mortality, produced fewer daughter plants, and accumulated less biomass than seedlings in low turbidity conditions. In addition, the seedlings in the turbid tanks had to invest proportionally more energy into above-ground tissues in an effort to compensate for the lower light conditions.