



**Title:** Norflurazon Toxicity to *Vallisneria americana*

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**Organization:** UF/IFAS Indian River Research and Education Center

**State:** FL      **Region:** Southern

**Year of Funding:**

**Theme:** Pollution Assessment and Prevention

**Situation:** One objective of the Indian River Lagoon-South restoration project is to stabilize water quality at a level suitable for promoting the growth, reproduction, and proliferation of *Vallisneria americana* in portions of the St. Lucie River. *Vallisneria americana* (common name, Tape grass) is a submersed plant that reproduces vegetatively and by seed. However, several herbicides have routinely been detected in water draining from the predominantly agricultural watershed. Concerns over potential toxicity of the herbicide norflurazon in agricultural drainage water prompted this study.

**Objectives:** The objective was to determine No Observable Effects Concentrations (NOEC) and Lowest Observable Effects Concentrations (LOEC) for *Vallisneria americana* exposed to the herbicide norflurazon following a 14 d exposure and a 14 d recovery period.

**Methods:** All plant stocks originated from Lake Okeechobee. Toxicity tests were conducted using juvenile plants (less than 3 weeks old) in the laboratory. Plants were exposed for 14 days to a series of concentrations of the herbicide. Measurement endpoints included: fresh weight gains, increases in leaf length, and SPAD (leaf green-ness) readings. Following the 14 day exposure period, measurements were taken and plants were rinsed and placed in non-spiked water for an additional 14 days to observe latent effects or recovery. In addition to the previous measurements, total chlorophyll and carbohydrate levels were also measured following the recovery period.

**Partnerships:** This project was a classic partnership between a granting agency (SFWMD) and grantee (UF/IFAS).

**Resources:** A team consisting of a UF/IFAS faculty member and three research technicians carried out the entire project. This team developed cultural and exposure methods over a three-month period prior to the toxicity assays. Before conducting the NOEC/LOEC studies, the team also conducted range-finding toxicity studies to define the testing range for the definitive studies. In addition to providing grant support to carry out the tests, the SFWMD also dedicated field resources to provide stock plants originating from Lake Okeechobee.

**Results:** The primary symptom of norflurazon toxicity was bleaching of newly emerged leaf blades. Varying degrees of recovery were seen depending on the endpoint. NOEC and LOEC results also differed depending on the measurement endpoint, with measurements of SPAD and offspring production being more sensitive measurements. LOECS and NOECS generally ranged from 0.04-0.1 mg/L for measurements. Carbohydrate levels within plants also differed.



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