AWRA 2011 ANNUAL WATER RESOURCES CONFERENCE
Albuquerque, New Mexico
November 7-10, 2011

NITROGEN CYCLING IN HEADWATER WATERSHEDS AND IN MANAGED STANDS OF AUTUMN OLIVE (ELAEAGNUS UMBELLATA THUNB) IN SOUTHERN ILLINOIS

Natalia Montano, Karl Williard, Andrew Somor, Derek Evans, Christine Goldstein, John Groninger, Jon Schoonover *

ABSTRACT: Autumn olive (Elaeagnus umbellata Thunb.) is an exotic, invasive shrub distributed in the eastern and midwestern U.S. It was introduced around 1830 for food and cover for wildlife. In a series of prior research projects, the presence of autumn-olive was correlated with increased soil water and stream NO^-_3-N concentrations due to its N-fixing properties. Vegetative management of autumn olive in invaded areas has shown temporary or restricted success. This research investigates two components for a more complete understanding of the effects of autumn olive on water quality and the impacts of its removal in soil nitrogen cycling in southern Illinois. The first component measured and characterized was nitrogen export as NO_3^--N from storm runoff in 12 forested headwater watersheds that had different percentage of autumn olive cover. There was a linear positive correlation between NO_3^--N concentration in the stream water and percentage cover of autumn olive in the watersheds. The highest concentration of NO_3^--N in the stream water during two different precipitation events occurred just before the peak of the stormflows, indicating a flushing of NO_3^--N from the soil profile.The second component of this research assesses the effects of autumn olive removal on soil N cycling and soil water nitrogen leaching in nine plots with dense autumn-olive cover. Each of the plots was randomly assigned one of three treatments: 1) autumn olive removal, 2) removal plus cut stump herbicide application, or 3) no action. Five tension lysimeters were installed in each plot to sample soil water below the rooting zone. Samples have been collected every two weeks since December 2007 and analyzed for NO^-_3-N and NH_4^+-N concentrations. After the first year of post treatment, mean soil water NO^-_3-N and NH_4^+-N concentrations were not significantly different among the three treatments. However since 2009, the removal only and removal and herbicide treatment plots had lower soil water NO_3^--N and NH_4^+-Nconcentrations than the control plots. This supported our original hypothesis that soil water NO_3^--Nin the removal plus herbicide plots will eventually decrease below the intact autumn-olive plots due to the lack of new N fixation.

* Graduate Student, SIUC, 1205 Lincoln Dr. Ag 184, Carbondale, IL 62901 USA, Phone: 618-967-8582, Email: natmo10@siuc.edu