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Using Stable Isotopes to Quantify Nitrogen Fates in Container Plants

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ABSTRACT

Currently, in the agriculture field, it is not yet known the accurate amount of Nitrogen in fertilizer that plants take up. This statistic, known as the Nitrogen Use Efficiency is currently known to be within the 30-50% range (Lea-Cox and Ross, 2001). This is very important figure to know and it is a figure that can be improved, and therefore much time, energy, and resources can be saved. This research project will use concepts involving stable isotopes to examine red maple plant material and the soilless media that the plants were grown in. Three different isotope-labelled fertilizer treatments will be used to determine the amount of Nitrogen taken up in the plant, in the runoff water, and released to the atmosphere. Plant and media samples will be analyzed using a mass spectrometer and an accurate account of Nitrogen can then be made. The data show that the Nitrogen taken up by the plant mostly contributes to the growth of new plant material, although there are significant amounts of ^{15}N in the old stem and old leaf samples. The conclusions that can be drawn are that Nitrogen that is processed into fertilizer is ultimately being wasted. Nitrogen is being leached into the ground water, immobilized by bacteria into organic Nitrogen, bound to the soil and media, and converted into NO_x and N_2 ; more research can be done, especially into the volatilization of the Nitrogen from fertilizers.

KEYWORDS

Nitrogen, Stable Isotopes, fertilizer, Nitrogen cycle

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