Table. 1 Data set information

Title of data set	Supporting data - Recycling of nitrate and organic matter by plants in the vadose zone of a saturated riparian buffer
Abstract	Data from the analysis of nitrate as nitrogen in the soil and soil pore water within the vadose zone of a saturated riparian buffer (SRB). Additional properties measured include: Organic matter (as %), bulk density, moisture content, and porosity. Soil samples were collected pre-growing season (n=57) and post-growing season from two plots (n=29): vegetated plots and barren plots. Statistical comparison of among the treatments, Pre-growing season, plot with plants, and barren plot, and among the different depths, 30 cm, 60 cm, and 90 cm identified significantly different soil NO_3^--N concentrations. Plots with plants experienced a reduction in nitrate from the soil and vadose waters. Plants withdrew nitrate from the vadose zone, generating organic matter. Nitrate concentrations in the soils underlying the barren plot were high because there was no uptake and the residual plants materials decomposed, returning nitrogen to the vadose. Soil pore water samples were collected using a lysimeter from the barren plots (n=64) and the vegetated plots (n=35).
Keywords	Nitrate, Saturated riparian buffer, Vadose zone, Assimilation, Plant Uptake, tile-drainage
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Organization associated with the data	Illinois State University
Usage Rights	Publicly available and free to use
Geographic region	McLean County, Central Illinois (40.614382ºN, -89.023542ºW)
Geographic coverage	Coverage of the data set is bounded by a stream which is one of the tributaries to the Illinois River. The area is surrounded by agricultural fields.
Temporal coverage -begin date	May 13, 2019

Temporal coverage - end date	November 30, 2019
General study design	Nitrate as nitrogen (NO_3^--N) concentration and organic matter content in soils collected from plot with plants and barren plots with depth were compared during pre-growing and post- growing seasons. NO_3^--N concentration in vadose waters collected from plot with plants and barren plots were compared during growing and post-growing season. These data were used to assess the role of plants in the transport and fate of nitrate in the SRB.
Methods description	Within the SRB, three experimental blocks were established, with each block was composed of two plots, a barren plot and a plot with plants. Before the growing season and prior to development (May), soil core samples were collected from different locations within the blocks at 30 cm, 60 cm and 90 cm depths below the ground surface. Collection was repeated in November as the plants went dormant for the season. Prior to the growing season (early spring) when the grass was about to green up, two soil-lysimeter arrays were installed in each plot, one along the upgradient boundary and one along the down gradient boundary. Each array included two suction lysimeters installed at depths of 30 cm and 60 cm. Attempts to draw waters samples occurred once every week over six months (June -Nov) from each array. Soil moisture conditions limited collection, and not all lysimeters yielded water during each sample event. The sampled waters were filtered and analyzed for NO_3^--N using the ion chromatography system. During the growing season (August 2019) and post growing season (October 2019), biomass samples were collected from the plot with plants. The vegetation above the surface in a square meter was harvested, and the dry biomass was quantified post-growing.
Laboratory, field, or other analytical methods	In the field, during each sampling event, cores were extracted using either a 0.05 m or 0.02 m internal diameter split spoon sampler. At intervals of 30 cm, 60 cm and 90 cm the cores were split vertically, and two composite samples were collected. One sample was used to determine the physical properties of the soil, and the second sample was used to quantify the nitrate as nitrogen (NO_3^--N) within the soil. The physical properties measured include gravimetric moisture content (Θ_m), bulk density (ρ_β), and porosity (n) (Marshall et al., 1996). The organic matter (OM) content was measured using loss on ignition at 500^{o}C (Schulte and Hopkins, 1996). Soil samples designated for NO_3^--N analysis were frozen immediately upon return to the lab for preservation until NO_3^--N extraction and analysis could be performed. NO_3^--N was extracted from within the sediment following the method presented by Mulvaney (1996). Ten grams of oven-dried sediment were placed in a glass container and 100 mL of 0.01 M solution of potassium chloride (KCl) was added to the sediment. The sediment-solution mixture was shaken for 60 minutes. Five milliliters of the solution were withdrawn from the container, filtered, and analyzed using a DIONEX ICS-1100 ion chromatography. The measured NO_3^--N concentrations represented the NO_3^--N mg/L in the extracted solution and were converted to grams of NO_3^--N per kilogram soil (g/kg). Statistical analysis was carried out by running a two-way ANOVA ($\alpha = 0.05$) to identify the statistical differences between the NO_3^--N among the treatments, Pre-growing season, Plot with Plants, and Barren plot, and among the different depths, 30 cm, 60 cm, and 90 cm. When the analysis revealed a significant difference among the treatments or depths, a Tukey Test was conducted to determine which differences were significant.

Quality control	Data quality was assessed using a series of sample blanks, sample duplicates, calibration verifications, and matrix spikes during each analytical run.
Additional information	References: Marshall, T. J., Holmes, J. W., & Rose, C. W. (1996). *Soil physics*: Cambridge university press. Mulvaney, R. (1996). Extraction of exchangeable ammonium and nitrate. *Methods of Soil Analysis: Part, 3*, 1129-1131. Schulte, E. E., & Hopkins, B. G. (1996). Estimation of soil organic matter by weight loss-on-ignition. In F. R. Magdoff, M. A. Tabatabia, & E. A. Hanlon (Eds.), *Soil organic matter: Analysis and interpretation* (pp. 21-31). Madison, WI: Soil Science Society of America.

Table 2. Description of data set variables.
Dataset filename: 2019_supporting_chemical_and_field_data_T3_nitrate_SRB.csv
Dataset description: Field and chemical data for soils and vadose waters collected from May 2019 to November 2019 in Central Illinois. L means location (Plot), H- hole, P- plot with plants, NP- barren plots, UG- upgradient, DG- downgradient. Zero concentration indicates a sample was not analyzed for nitrate.

Column name	**Description**	**Units**
Date	Date the sampled was collected	
Location	Location (Block) where sample was collected.	
Treatment	Describes the plot, Plot with plants or barren plot, exception are samples collected Pre-Growing season	
Season	Designates Pre-growing, Growing, or Post-growing season	
Type	Designates either soil or lysimeter (water) sample	
Depth	Depth from the ground surface where the soil sample was collected	cm
Bulk Density	Bulk density of the soils	g/cm^3
Volumetric Moisture Content	Moisture content based on volume	mL/mL
Gravimetric Moisture Content	Moisture content based on mass	g/g
Porosity	Porosity of the soils	
NO_3^-N_Soil	Concentration of nitrate as nitrogen in soils	g/kg
NO_3^-N_water	Concentration of nitrate as nitrogen in soils expressed as nitrate in the available soil water. For the lysimeter samples, it is the value measured from the water. For the soil it is calculated from the g/kg and the moisture content in the water.	mg/L
Organic Matter	Mass percentage of organic matter content of soil	%