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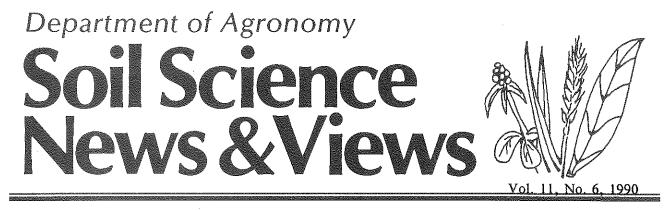
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UNIVERSITY OF KENTUCKY COLLEGE OF AGRICULTURE Lexington, Kentucky 40546



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Has The Nitrate-Nitrogen in Streams Draining Agricultural Watersheds in Kentucky Changed in the Last 18 Years?

Grant W. Thomas, Gerald R. Haszler and James D. Crutchfield

In 1971 and 1972, we sampled streams across Kentucky for nitrate-nitrogen (NO₃-N) during the highwater flow months of January through June. The results were variable and showed a dominant effect of geology and lesser effects of both time and land use on the results. Since that time, use of fertilizer nitrogen (N) has nearly doubled in Kentucky and, further, there is a high degree of concern among the public that NO₃-N from fertilizer use may be contaminating streams. The US Environmental Protection Agency has set a maximum of 10 ppm NO₃-N in water as being safe for human consumption.

Because of that concern, we again began a monthly sampling of the same streams in December 1989 with the intention of determining what changes might have occurred since 1971-72. At the moment, we have completed five months of data which are shown in table 1. In no case are the values higher than the average of those found in 1971-72, and in three cases (Flat, Plum and Rose Creeks) the values are lower than they were 18 years ago when use of fertilizer N was lower. Cave Creek with a watershed that is practically 100% in horse pasture, is still the highest by far in NO₃-N, as it was 19 years ago. The Perry and Rose Creek watersheds that have the highest amount of row crops, (and arguably, the greatest fertilizer N use) show significant quantities of NO₃-N, but Rose creek is definitely lower than before and Perry creek has not changed.

One factor that has changed in the past 19 years is a new subdivision constructed along Perry creek which is served by a small sewer treatment plant. Water samples taken above and below the sewage outlet in Perry creek are shown in table 2. It is clear that sewage from the subdivision is making a measurable difference, particularly during low flow (December).

Summary

Although our current data are preliminary, they show clearly that there has been no increase in NO_3 -N in the same streams sampled 18 and 19 years ago. In three of the seven streams NO_3 -N nitrate-nitrogen appears to have dropped. Cave Creek, which has virtually no row crops nor houses in its watershed still shows the highest NO_3 -N of all seven streams sampled. The average of six streams studied by McHargue and Peter in 1921 in the Inner Bluegrass was 5.5 ppm of NO_3 -N. The grand average of 1971, 1972 and 1989-90 data gathered thus far gives an average of 5.11 for Cave Creek. Obviously, geology is an important factor in the level of nutrients in streams.

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	County	<u>1989</u> Dec	1990						Avg	Avg
Stream			Jan	Feb	Mar	Apr	1971	1972	1971-72	1989-90
					- ppm N	0 ₃ -N in w	ater		.	
Cave Creek	Fayette	3.90	4.89	4.35	5.25	3.46	6.48	4.48	5.48	4.37
Flat Creek	Franklin	0.31	0.26	0.19	0.38	0.18	2.57	0.49	1.53	0.26
Plum Creek	Spencer	1.23	0.87	0.14	1.30	0.42	2.78	1.08	1.93	0.79
McGills Creek	Lincoln	0.61	1.02	0.67	0.99	2.61	1.54	0.48	1.01	0.78
W. Bays Fork	Allen	0.94	1.16	0.79	1.06	1.69	1.90	0.64	1.27	1.13
Rose Creek	Hopkins	0.05	1.83	1.50	2.75	0.80	5.79	2.74	4.27	1.39
Perry Creek	Graves	0.05	1.91	2.32	1.53	0.49	1.76	0.93	1.35	1.26

Table 1. Nitrate-Nitrogen in Kentucky Streams in 1971-1972 and 1989-90.

Table 2. Effect of sewage effluent on NO₃-N Content of Perry Creek.

<u>Month</u>	<u>Above Sewage Effluent</u>	<u>Below Sewage Effluent</u>
	pp	m NO ₃ -N
Dec., 1989	0.05	8.80
Jan., 1990	1.91	
Feb., 1990	2.32	2.39
Mar., 1990	1.53	2.33
Apr., 1990	0.49	2.85

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