SURFACE RUNOFF N AND P LOSSES FROM CLAYPAN SOIL AFTER TURKEY LITTER AND FERTILIZER APPLICATION

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Introduction

Loss of nutrients and sediment in runoff are significant threats to surface water quality. Little information is available on relative losses of nutrients from animal wastes as compared to commercial fertilizers, especially in south-eastern Kansas. Percolation is restricted through the subsurface horizon of the claypan soils of the area and distribution of the more than 100 cm of annual precipitation is poor. With no aquifers in southeastern Kansas, water quality concerns from agriculture focus primarily on losses in runoff of surface water.
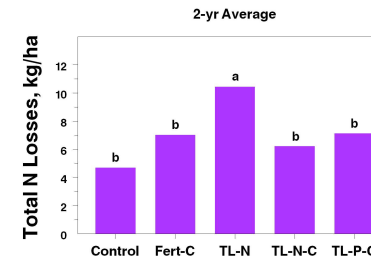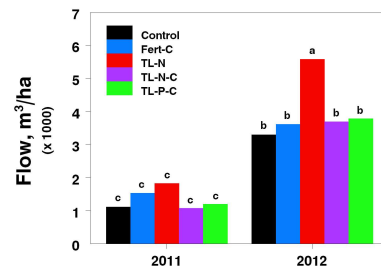
Objectives

- To compare surface runoff losses of nutrients and sediment from turkey litter manure and fertilizer
- To determine the influence of tillage on nutrient and sediment losses in surface runoff
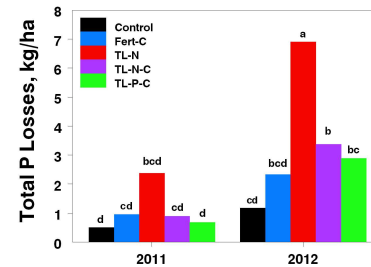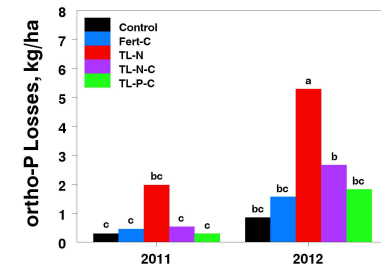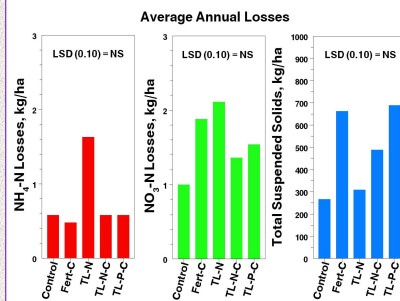
Treatments

Control – No N or P from fertilizer or turkey litter: no-till

Fert-C – Only commercial fertilizer to supply 135 kg N/ha and 24 kg P/ha with no turkey litter: conventional tillage

TL-N – (Turkey Litter: N based) – Turkey litter applications to supply 135 kg N/ha for the sorghum crop [~ 6 Mg Litter/ha – that also provides excess P (~160 kg/ha)]: no-till

TL-N-C – (Turkey Litter: N based) – Same as "TL-N" treatment but with incorporation of turkey litter: conventional tillage

TL-P-C – (Turkey Litter: P based) –Turkey litter applications to supply 24 kg P/ha with supplemental N to supply 135 kg N/ha: conventional tillage

Individual plot size = 0.4 ha
2 reps – 1 % slope
Grain sorghum grown in 2011 and 2012

Upslope view of water quality plot at Greenbush (Girard, KS)

Application of turkey litter on research plot at Greenbush

Turkey Litter Analyses
- g/kg (dry matter basis) -

	2011	2012	Avg.
Total N	38.9	47.9	43.4
NH_4-N	6.3	10.8	8.6
NO_3-N	0.1	0.1	0.1
Org-N	32.5	37.0	34.8
"PAN"	21.4	27.2	24.3
Total P	31.0	25.4	28.2

Organic N is calculated from Total N minus (NH_4-N and NO_3-N)

Potentially available N (PAN) is estimated to be the sum of the fraction of Org-N that mineralizes (assumed to be 50%) plus the fraction of NH_4-N that does not volatilize (assumed to be 80%) plus NO_3-N

Summary

Losses of NH_4-N, NO_3-N, and sediment were unaffected by treatment. Total N losses were greater in the N-based turkey litter/no-till treatment with no differences in total N loss from the other treatments. Ortho-P losses accounted for approximately 70% of the total P loss and both were affected by a treatment by year interaction. Ortho- and total P losses were statistically unaffected by treatment in the first year, but P loss in the second year from the N-based turkey litter/no-till treatment was more than twice that from the other treatments. During the first two years of this study, incorporation of the high rate, N-based turkey litter resulted in annual nutrient losses that were not different than losses from treatments receiving a lower rate, P-based turkey litter application or only fertilizer.