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Introduction

- Nitrogen fertilizer management is vital to no-till corn (*Zea mays*) production from financial and environmental perspectives.
- Poultry litter (PL) as a nutrient source is generally land applied by surface broadcast.
- Broadcasting poultry litter has potential for producing malodor and volatilization of ammonia (NH₃-N).
- A new application method allows subsurface banding of poultry litter with minimal soil surface disturbance.
- There is limited data with this application method on no-till corn production.

Objective

This study evaluated the agronomic response of corn and soil nutrient concentrations from subsurface banded poultry litter application, compared to poultry litter surface broadcast application and a commercial fertilizer treatment.



Material and Methods

- Large scale no-till corn plots (7.6 m x 91.2 m)
- Treatments applied pre-plant at a rate of 168 kg N ha⁻¹
 - Standard commercial fertilizer surface applied (30% UAN)
 - Poultry litter surface applied (PL Broadcast)
 - Poultry litter subsurface banded 30 cm apart and 8 cm deep (PL Subsurface)
- Prototype poultry litter subsurface banding machine developed by USDA-ARS DMFSRC, Booneville, AR
- Two year study on a Wheeling soil (fine-loamy, mixed, active, mesic Ultic Hapludalfs) near Owensboro, KY
- Corn planted April 25, 2010 and May 20, 2011.

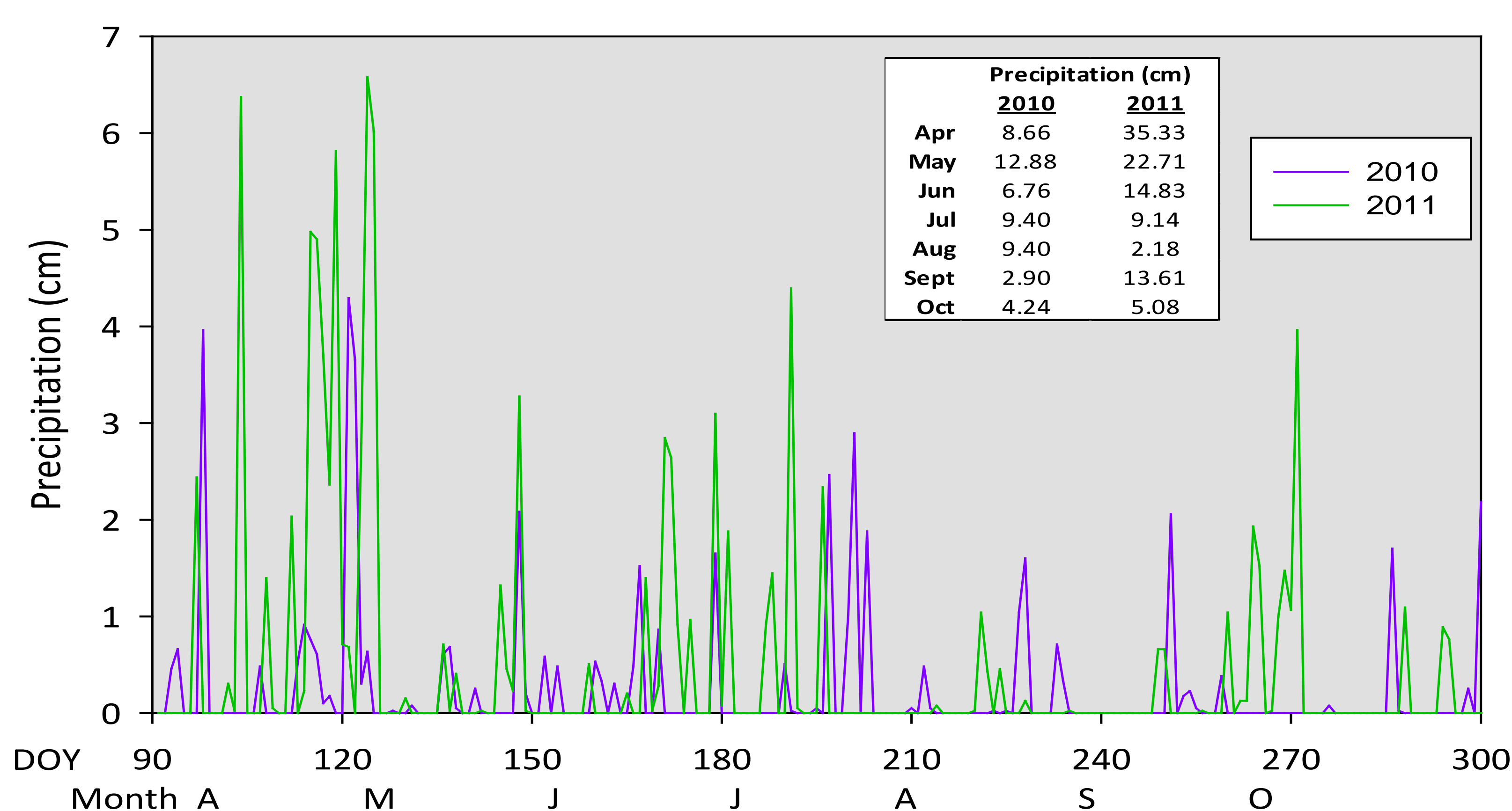


Table 1. Selected properties of the soil sampled at 0-15 cm depth prior to treatment applications in the spring 2010 and properties of the poultry litter applied each year in the spring before planting (2010-2011).

Year	pH	Total C	Total N	NH ₄ -N	NO ₃ -N	P	K
		-----g kg ⁻¹ -----		-----mg kg ⁻¹ -----			
Soil							
19-Apr-10	5.45	9.2	1	12.04	7.22	233.1	295.51
		-----g kg ⁻¹ -----					
Poultry litter							
2010	5.75	286.3	36	5.44	0.53	16.09	37.9
2011	6.75	269.1	30	6.21	0.34	20.76	36.44

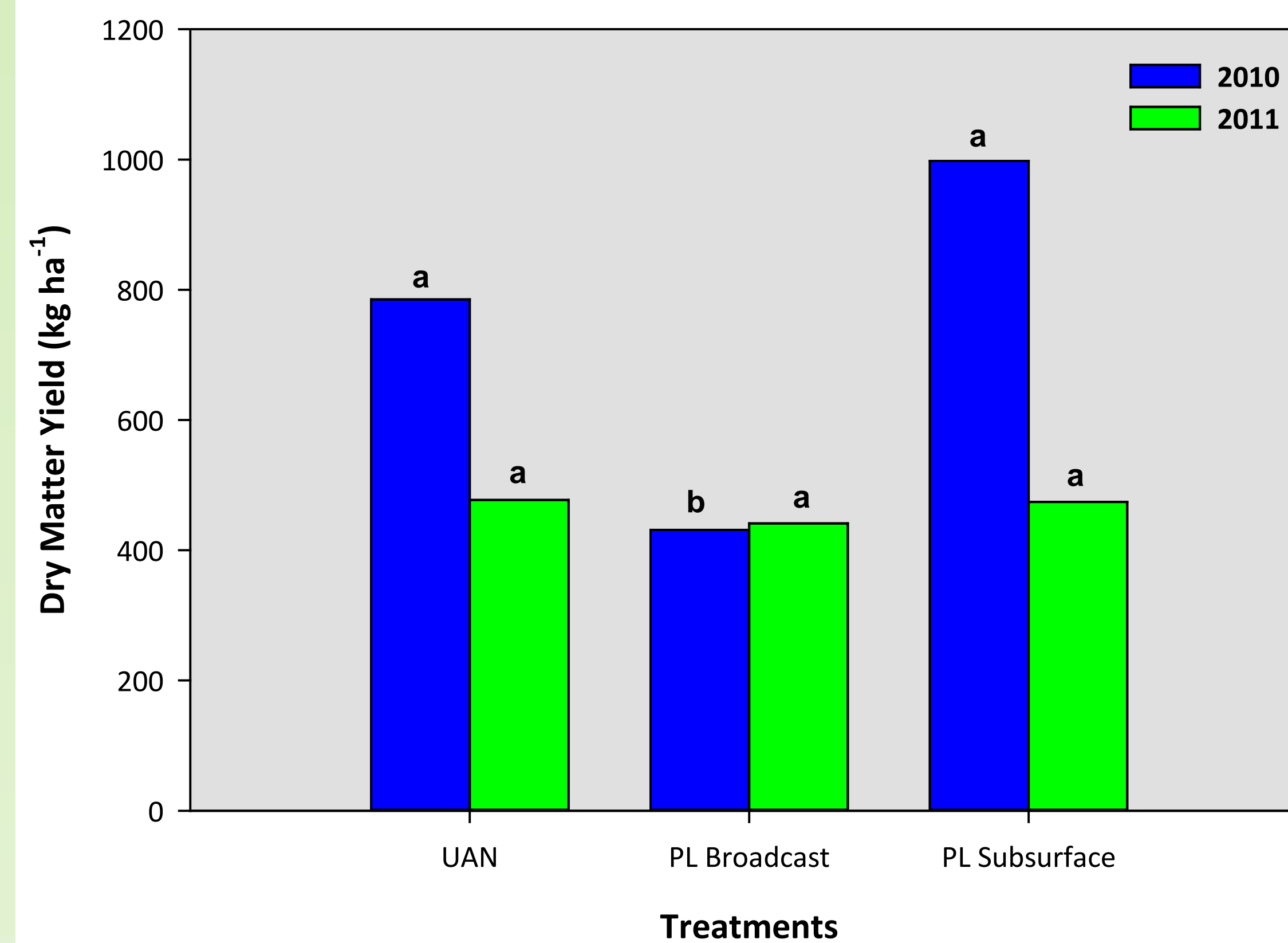


Figure 1. Corn aboveground dry matter yield at V5 growth stage response to 30% UAN, poultry litter surface broadcast, and poultry litter subsurface banded as nutrient source for 2010 and 2011. Within each year, bars having the same letters are not significantly different according to LSD 0.05 level.

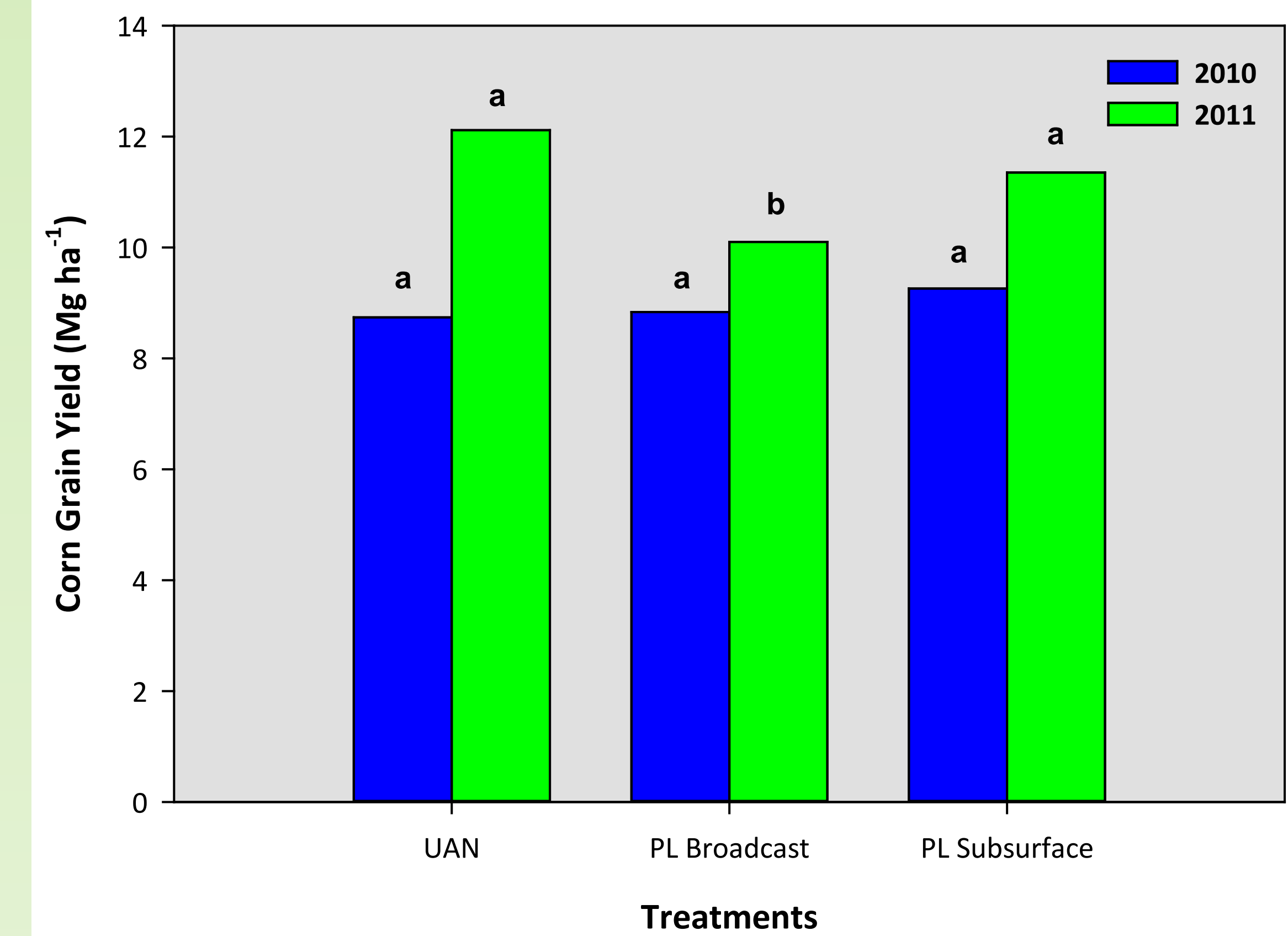


Figure 2. Corn grain yield response to 28% UAN, poultry litter surface broadcast, and poultry litter subsurface banded as nutrient source for 2010 and 2011. Within each year, bars having the same letters are not significantly different according to LSD 0.05 level.

Table 2. Effects of treatments on select soil properties taken 0-15 cm depth at post-grain harvest and the associated ANOVA averaged over the two years (2010- 2011).†

Year (Y)	pH	Total C	Total N	NH ₄ -N	NO ₃ -N	P	K
		-----g kg ⁻¹ -----		-----mg kg ⁻¹ -----			
2010	6.12 a	9.02 a	0.98 a	2.50 a	14.41 a	246.9 a	288.7 a
2011	5.92 b	8.74 a	0.92 a	2.65 a	7.12 b	262.4 a	268.1 a
LSD _(0.05)	0.18	1.12	0.12	1.09	2.44	63	38.1
Treatment (T)							
30% UAN	5.88 a	9.07 a	0.95 a	2.17 a	9.17 b	245.1 a	224.8 b
PL Broadcast	6.19 a	9.35 a	1.02 a	2.81 a	12.74 a	226.4 a	301.0 a
PL Subsurface	6.00 a	8.23 a	0.88 a	2.74 a	10.38 ab	292.6 a	309.5 a
LSD _(0.05)	0.33	1.38	0.15	1.34	2.99	77.2	46.7
ANOVA							
Y	*	ns	ns	ns	*	ns	ns
T	ns	ns	ns	ns	*	ns	*
YxT	ns	ns	ns	ns	ns	ns	ns

† Values for the same effects, within columns followed by the same letters are not significantly different according to LSD_(0.05) level.

* Significant at the 0.05 level.

Conclusions

- PL Subsurface plots resulted in corn grain and aboveground biomass yields similar to plots treated with UAN in 2010 and 2011 (Fig. 1 and 2).
- PL Subsurface and UAN treatments resulted in significantly higher V5 dry matter yields in 2010 (Fig. 1) and corn grain yields (Fig. 2) in 2011 than PL Broadcast amended plots.
- Overall lower corn grain yields in 2010 may have resulted from inadequate rainfall during the months of May and June (Fig. 3).
- Poultry litter application method did not have a significant effect on soil pH and soil nutrient concentrations (Table 2).
- Results suggest that subsurface banding of poultry litter can be utilized as an alternate application method in no-till corn system without detrimental impacts on corn productivity.
- Future work is needed to determine the impact of lateral subsurface band placement in relation to corn rows corn growth and yield.