

# DISTRIBUTION OF SOIL CARBON AND NITROGEN IN A CORN AND SOYBEAN FIELD

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## INTRODUCTION

Studies on soil carbon and nitrogen show that they are often unevenly distributed across a field and this ultimately affect crop yield (Kvaerno et al., 2007, Tesfahunegn et al., 2011). Factors responsible for the uneven distribution of soil carbon and nitrogen include, but not limited to, type of management practices (type and frequency of fertilizer application), land use, vegetation cover, topographic effects of soil erosion and depth (Tesfahunegn et al., 2011). Therefore, understanding the distribution of soil carbon and nitrogen is important in predicting crop yield and future crop and land management planning (Lopez Bellido et al., 2011). Since no in-depth study has looked at soil carbon and nitrogen at Freeman farm, our objective was to assess the distribution of soil total carbon (TC) and total nitrogen (TN) at 0 to 60 cm depth in the corn and soybean field.

## MATERIAL/METHODS

**Study Area/Soil:** Freeman farm in central Missouri; Waldron silty-clay loamy substratum and Booker silty clay

**Laboratory Analysis:** Soil samples were taken from the field; fresh and dry weights were taken and sent to a commercial laboratory for carbon and nitrogen analysis.

## RESULT/DISCUSSION

- ❖ TC was about 0.90% in the first three depths and increased shortly to 1.1% in the last depth (40-60 cm) (Table 1).
- ❖ TN, however did not change and was about 0.10% in all depths (Table 1).
- ❖ Consequently, the C/N ratio also changed and ranged between 9.05 in 0-10 cm to 9.18 in 40-60 cm depth (Table 1).

❖ Variogram analysis showed that the sills ( $C_0+C$ ) ranged between 0.042 m to 2.18 m for TC; 0.00003 m to 0.00044 m for TN and 0.37m to 0.65m for C/N ratio (Table 1).

Depth	TC	TN	C/N
<b>0-10cm</b>			
Mean	0.9246	0.1029	9.0498
SD	0.2297	0.0176	0.7769
CV	24.840	17.121	8.5843
Range ( $A_0$ ) (m)	8.2800	7.2000	7.1100
Sill ( $C_0+C$ )	0.0590	0.0003	0.6450
<b>10-20cm</b>			
Mean	0.9104	0.1021	9.0715
SD	0.2170	0.0210	0.6402
CV	23.833	20.603	7.0570
Range ( $A_0$ ) (m)	6.9400	11.220	25.773
Sill ( $C_0+C$ )	0.0438	0.0004	0.4212
<b>20-40cm</b>			
Mean	0.9846	0.1010	9.1417
SD	0.2038	0.0205	0.6608
CV	22.046	20.338	7.2289
Range ( $A_0$ ) (m)	6.5400	6.4800	25.773
Sill ( $C_0+C$ )	0.0422	0.0004	0.4373
<b>40-60cm</b>			
Mean	1.0794	0.1031	9.1831
SD	1.1257	0.0224	0.5622
CV	104.29	21.744	6.2307
Range ( $A_0$ ) (m)	21.616	5.3800	7.5300
Sill ( $C_0+C$ )	2.1800	0.0004	0.3672

TC= Total Carbon, TN= Total Nitrogen, C/N= Carbon/Nitrogen ratio

Table 1. Summary of statistics and variogram parameters for TC, C/N and TN

## SUMMARY

- ❖ The results of the variogram analysis suggests a strong variability distribution of soil carbon and nitrogen in this field (Table 1).
- ❖ Field maps also confirmed a non uniform distribution of TC, TN and C/N across the field..
- ❖ As a result of the uneven distribution of soil carbon and nitrogen, understanding their variability is important in predicting crop yield.

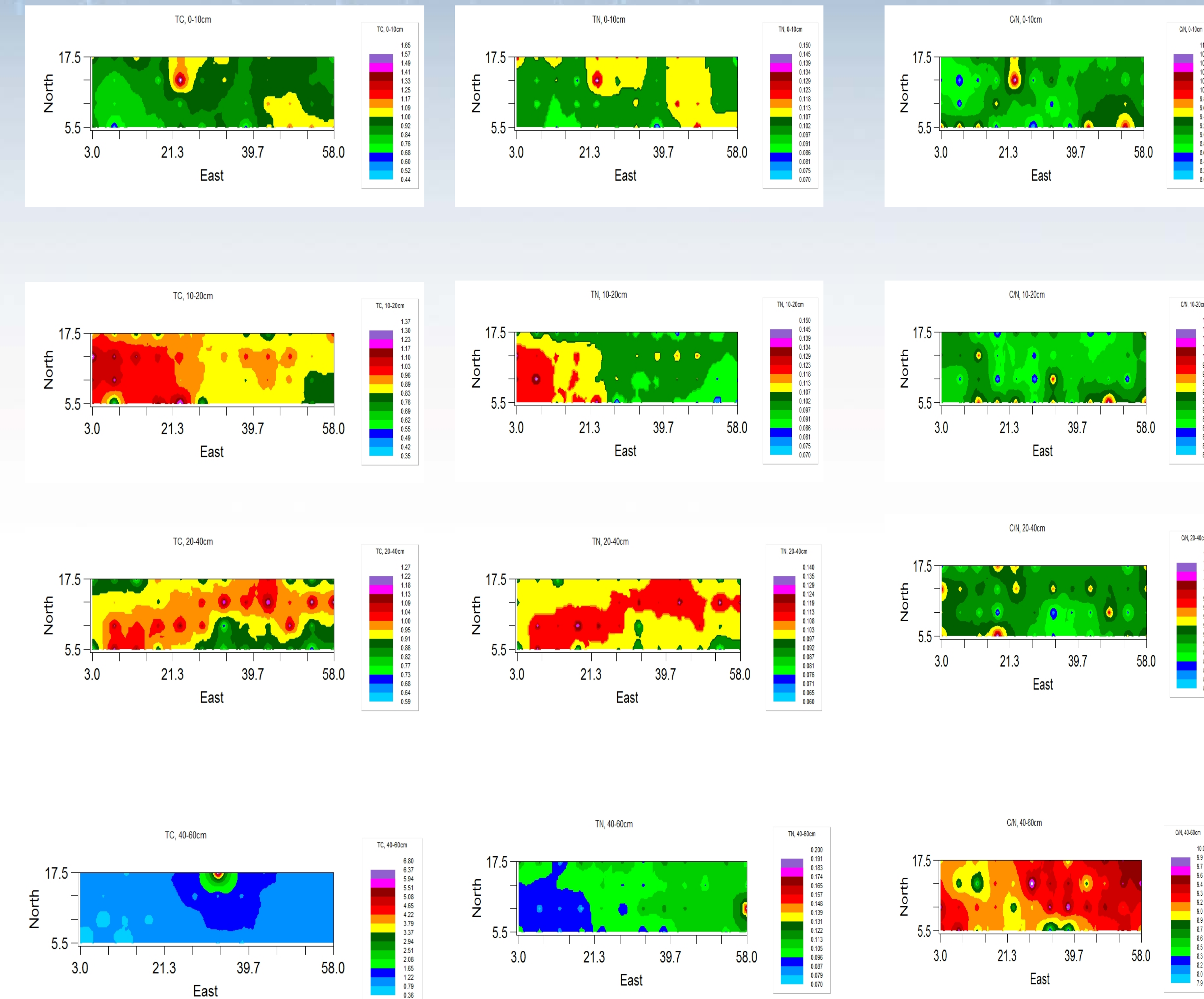


Fig. 1. Distribution of soil carbon and nitrogen with depth.

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