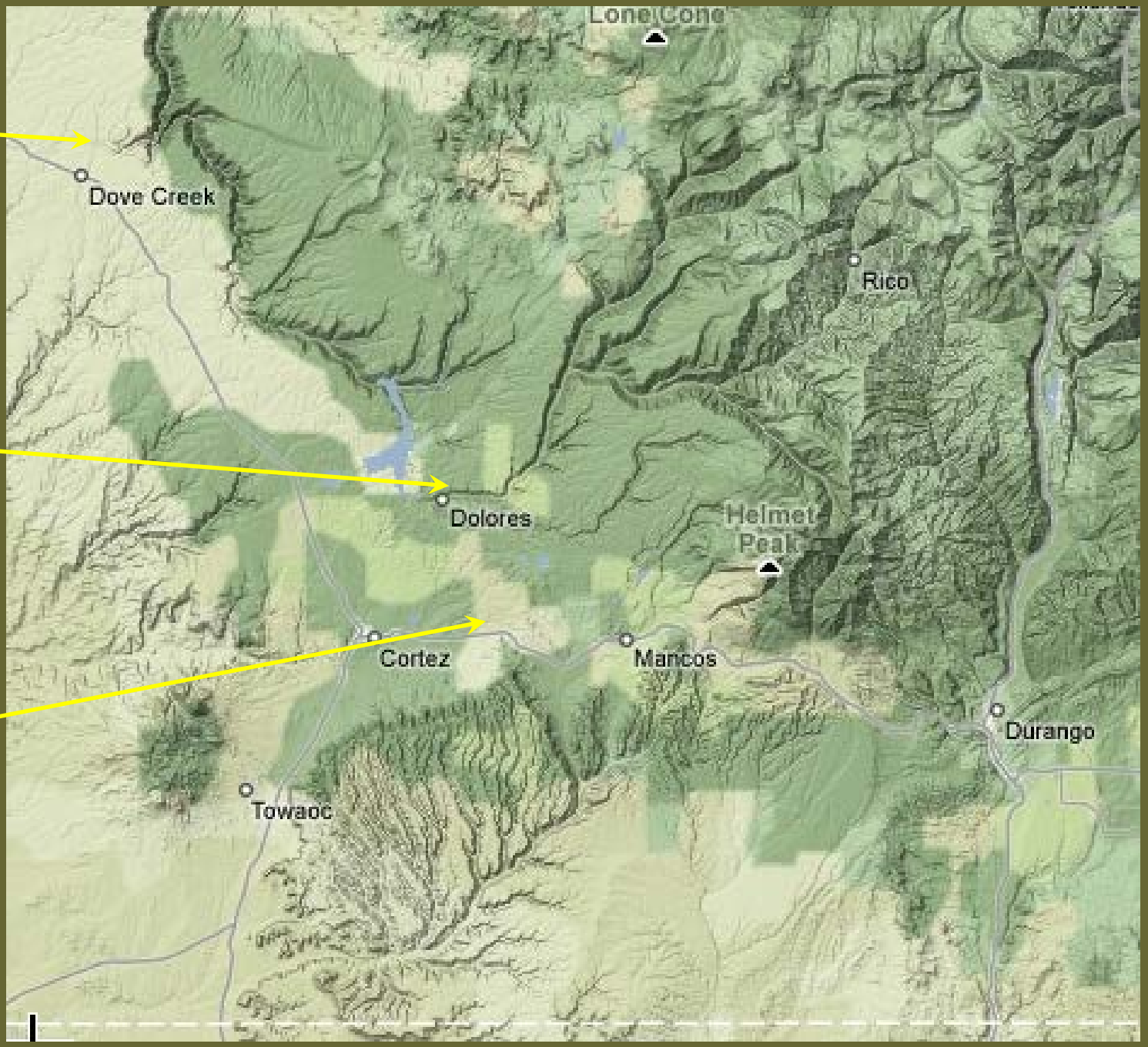
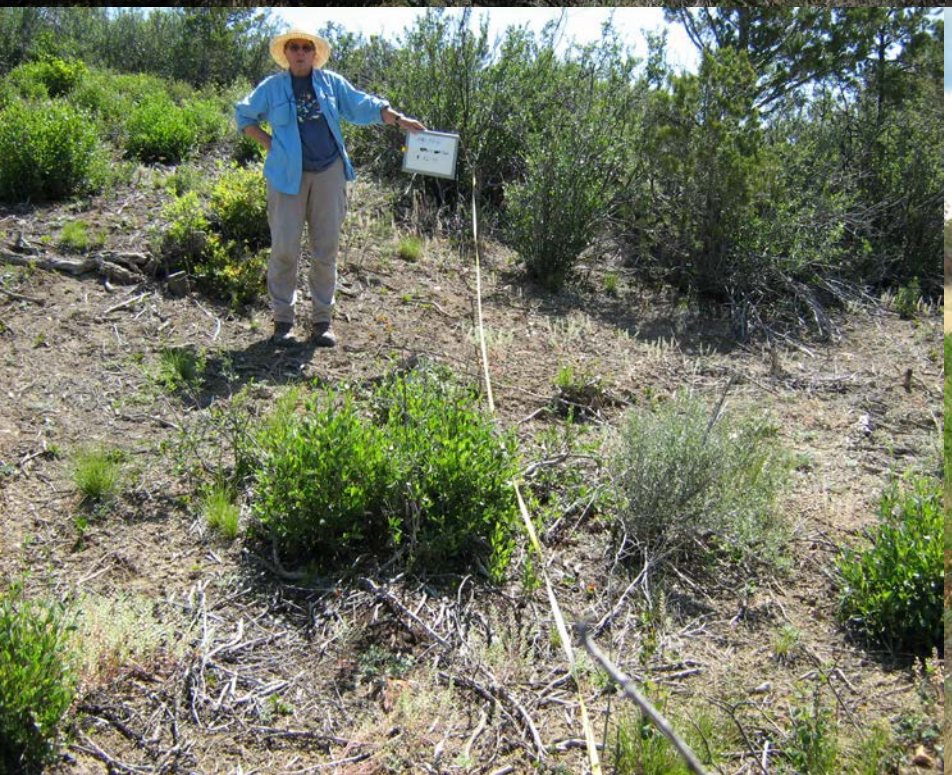
Does mastication alter soil N dynamic in Pinyon-Juniper woodlands of southwest Colorado?

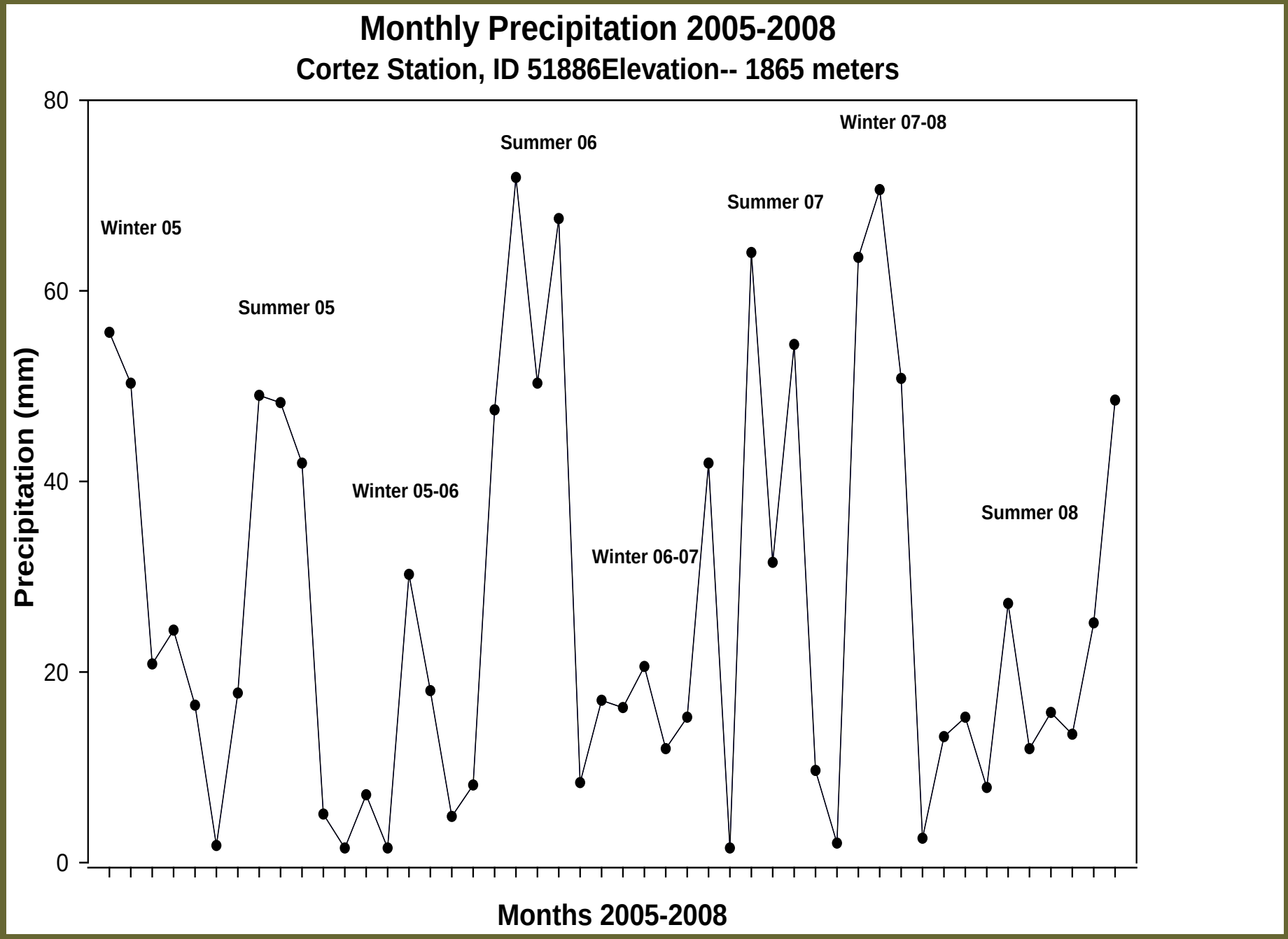
By

Steve Overby

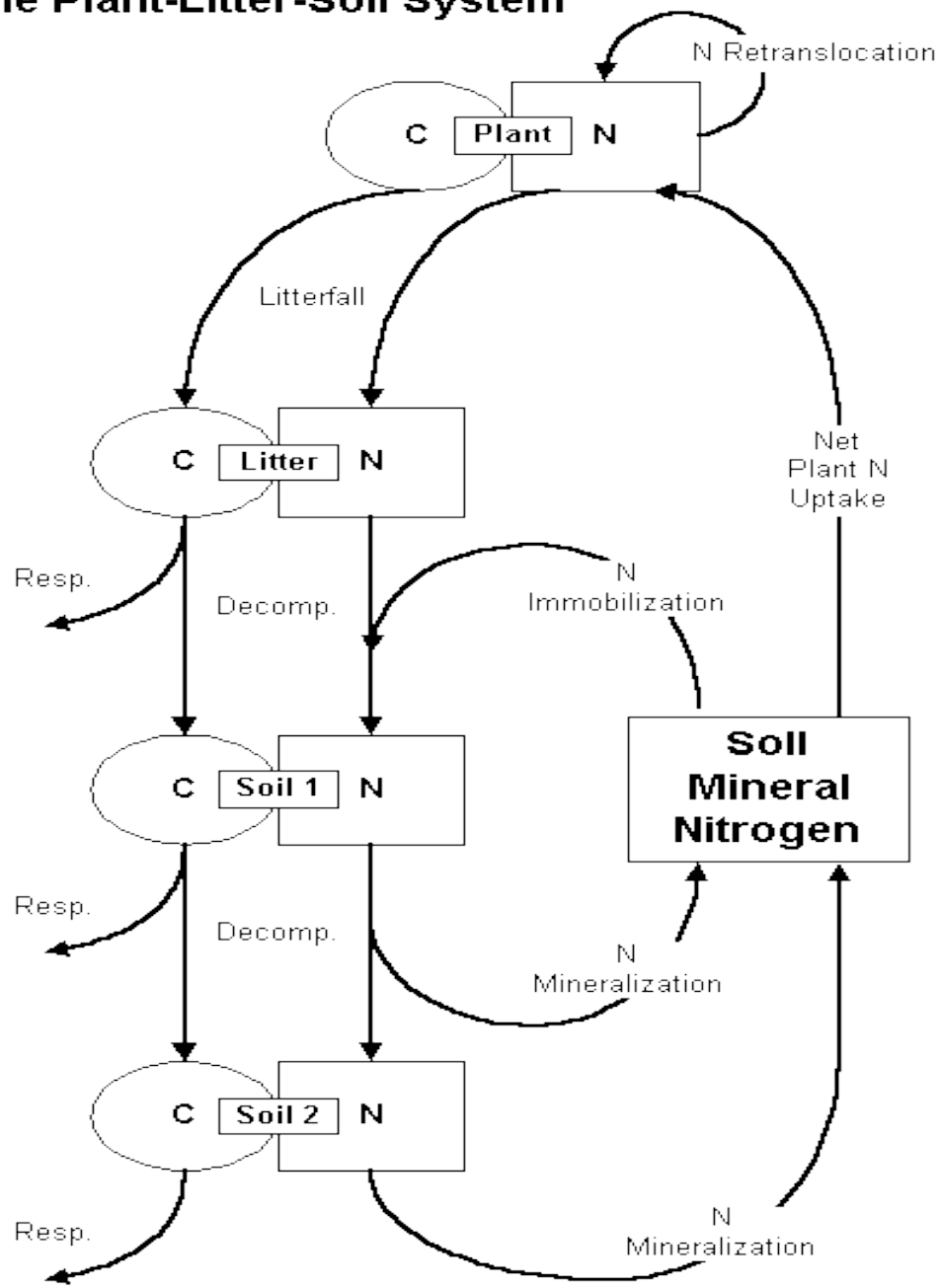
Gerald Gottfried

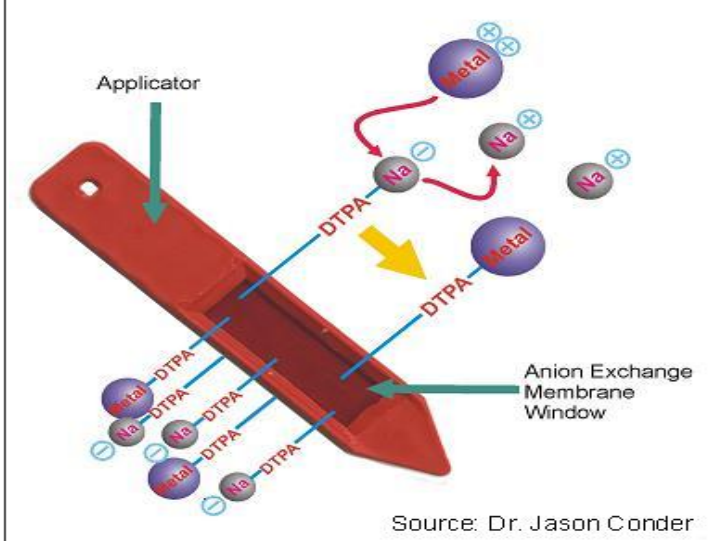

School
May Canyon
Summit
Lone Cone
Dove Creek
Rico
Dolores
Helmet Peak
Cortez
Mancos
Durango
Towaoc




Monthly Precipitation 2005-2008
Cortez Station, ID 51886Elevation-- 1865 meters
Precipitation (mm)
80
60
40
20
0
Winter 05
Summer 05
Winter 05-06
Summer 06
Winter 06-07
Summer 07
Winter 07-08
Summer 08
Months 2005-2008

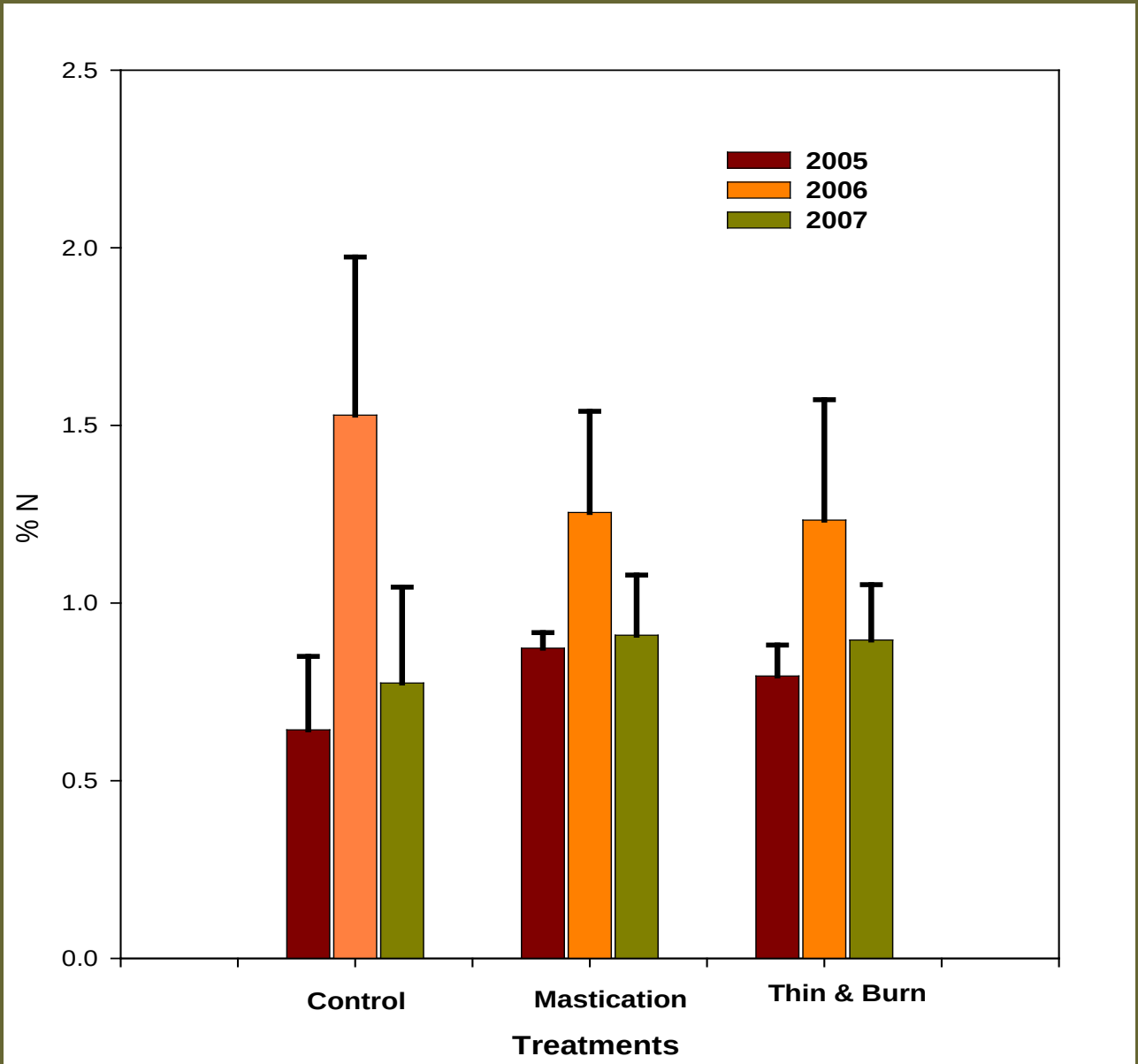
Primary Linkages between C and N in the Plant-Litter-Soil System



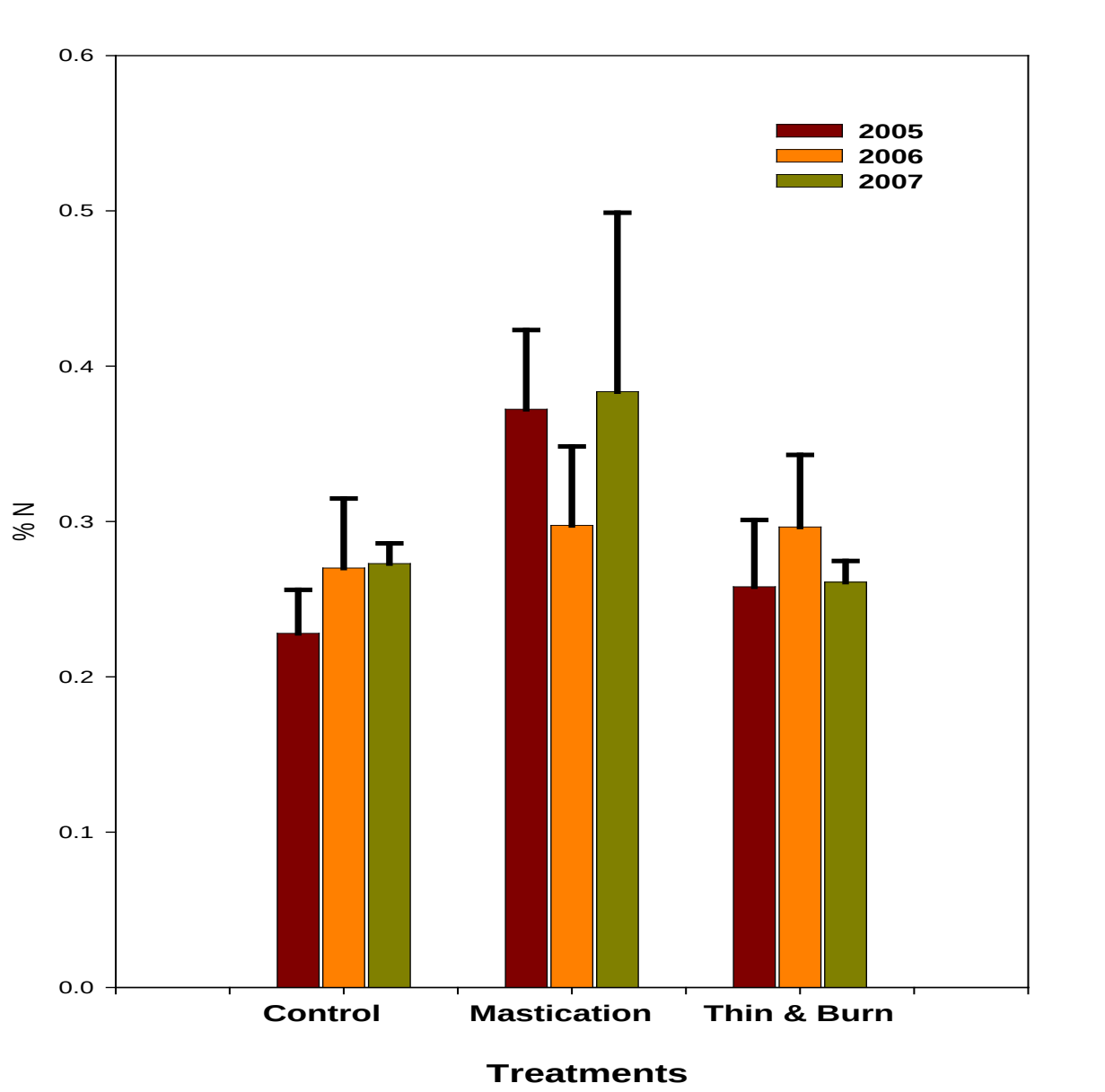


Source: Dr. Jason Conder

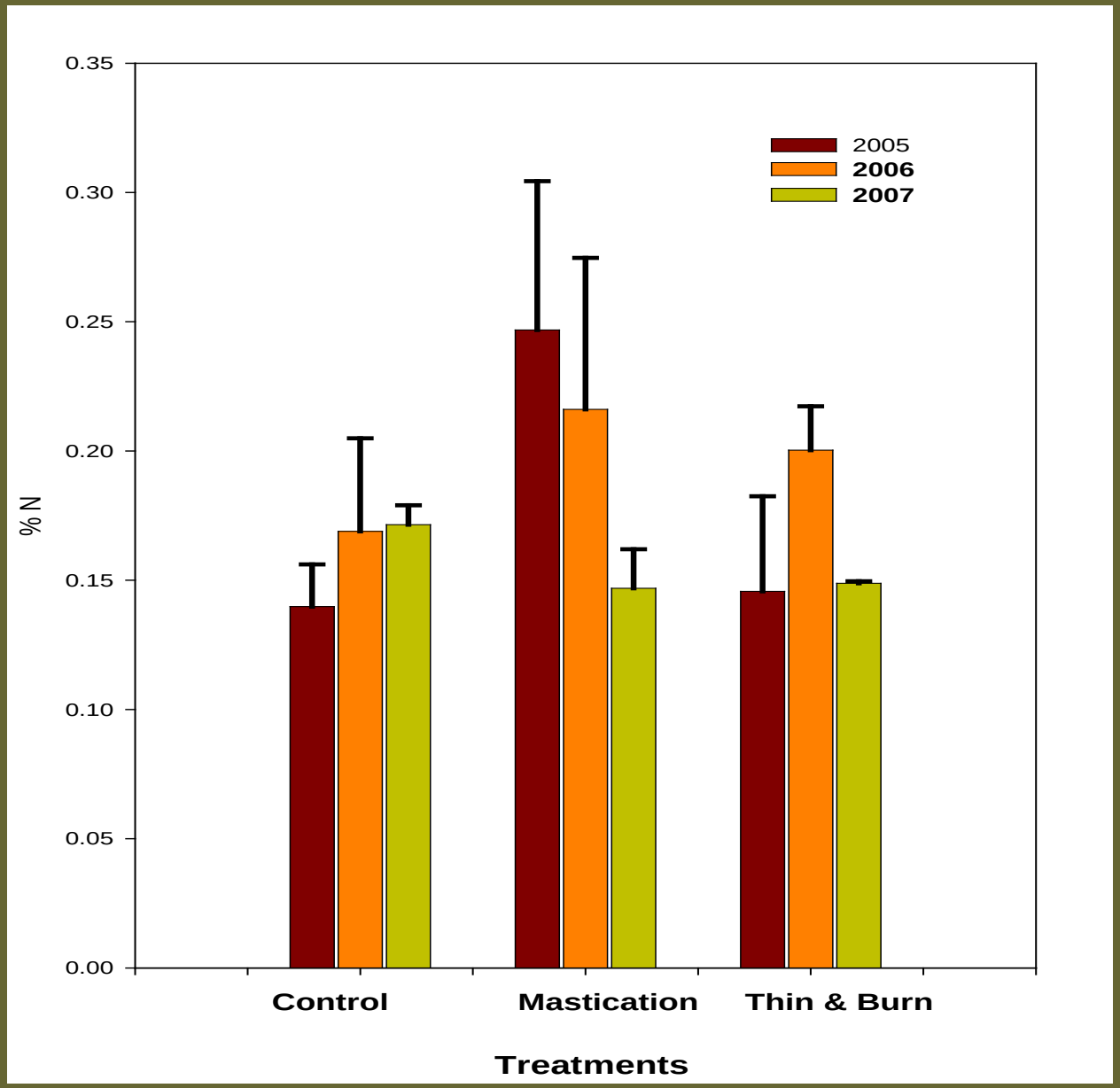
Total litter N concentration at SW Colorado P-J sites



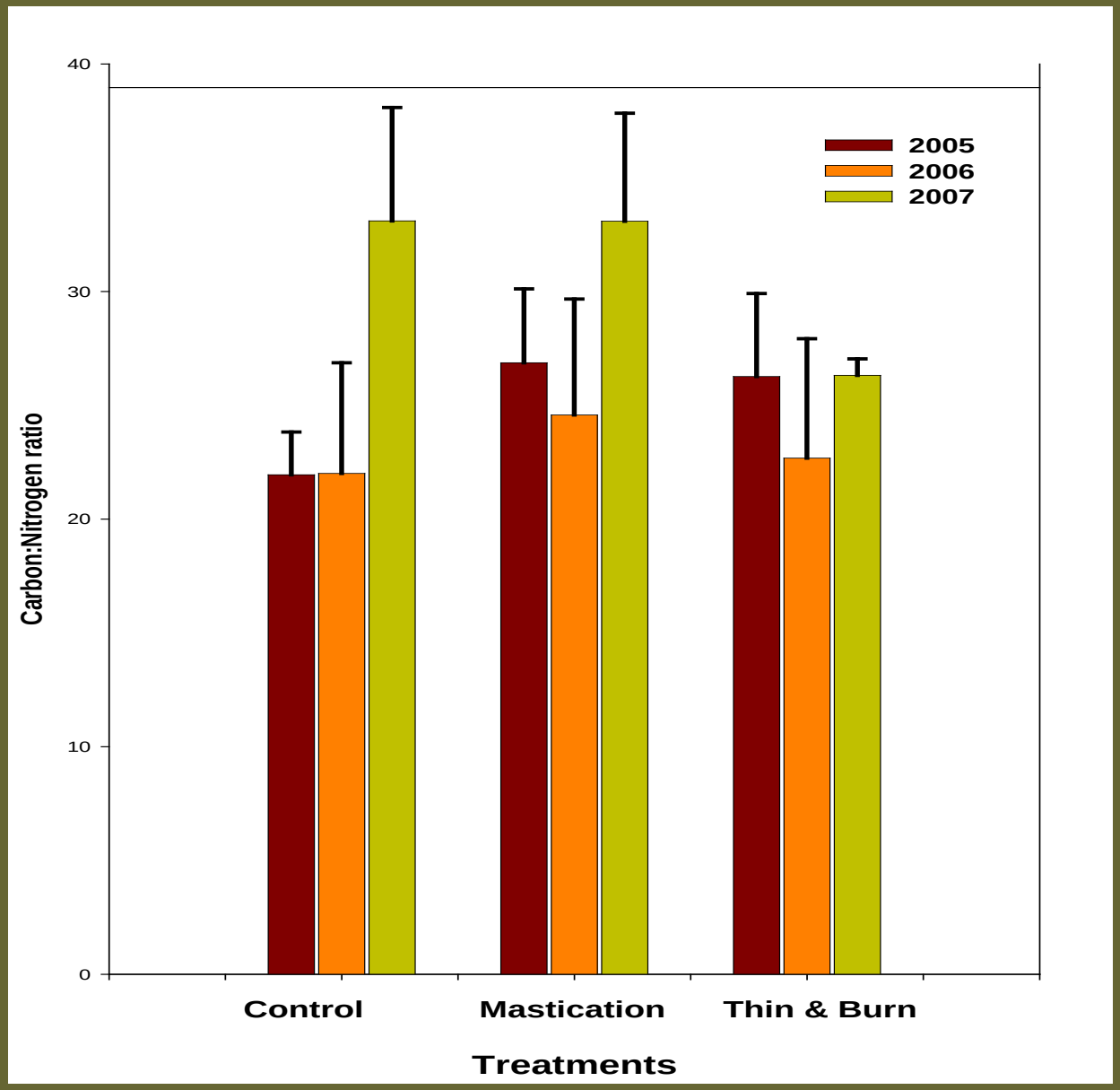
Total soil (0-5 cm) N concentration at SW Colorado P-J sites



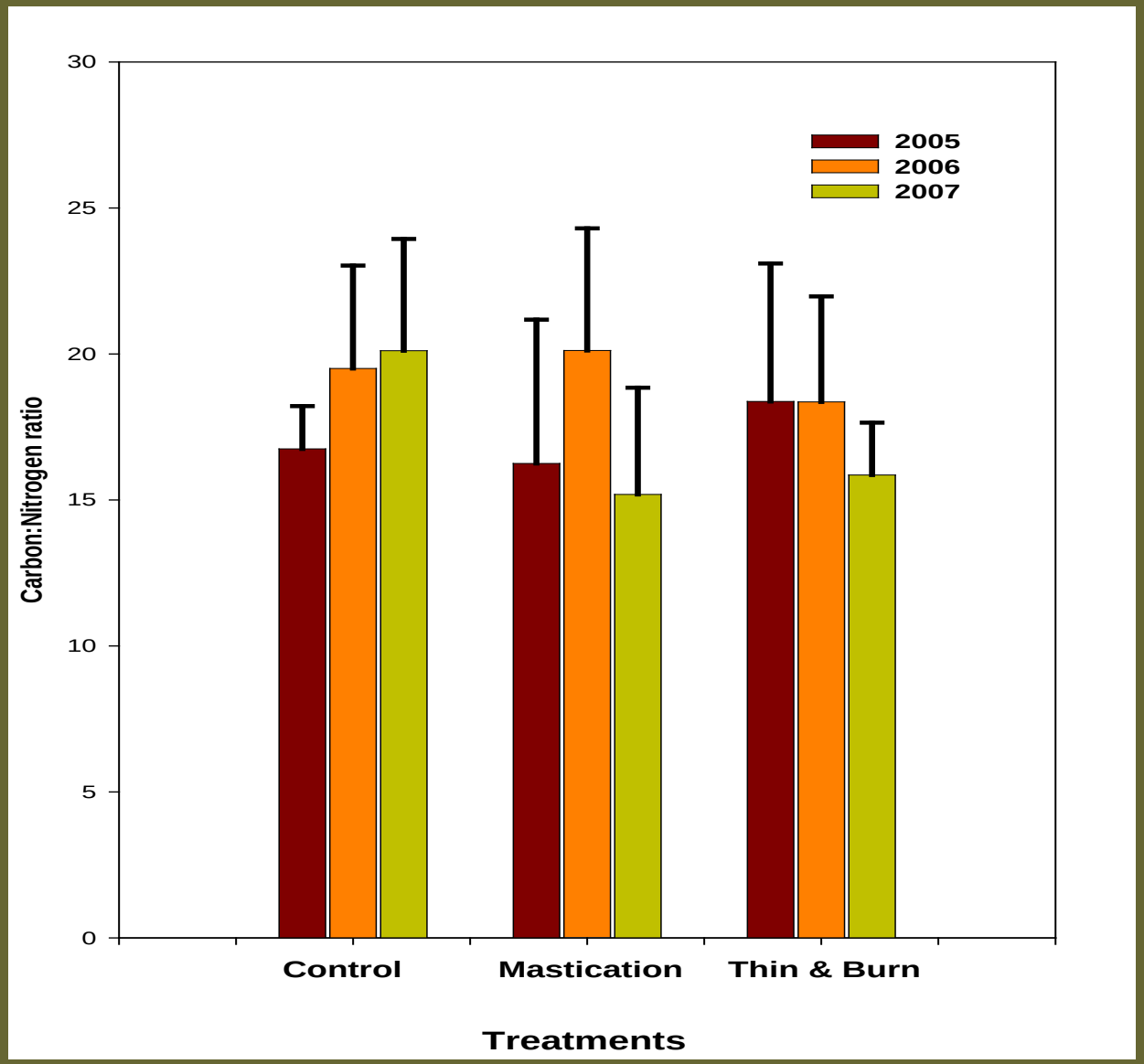
Total soil (5-15 cm) N concentration at SW Colorado P-J sites



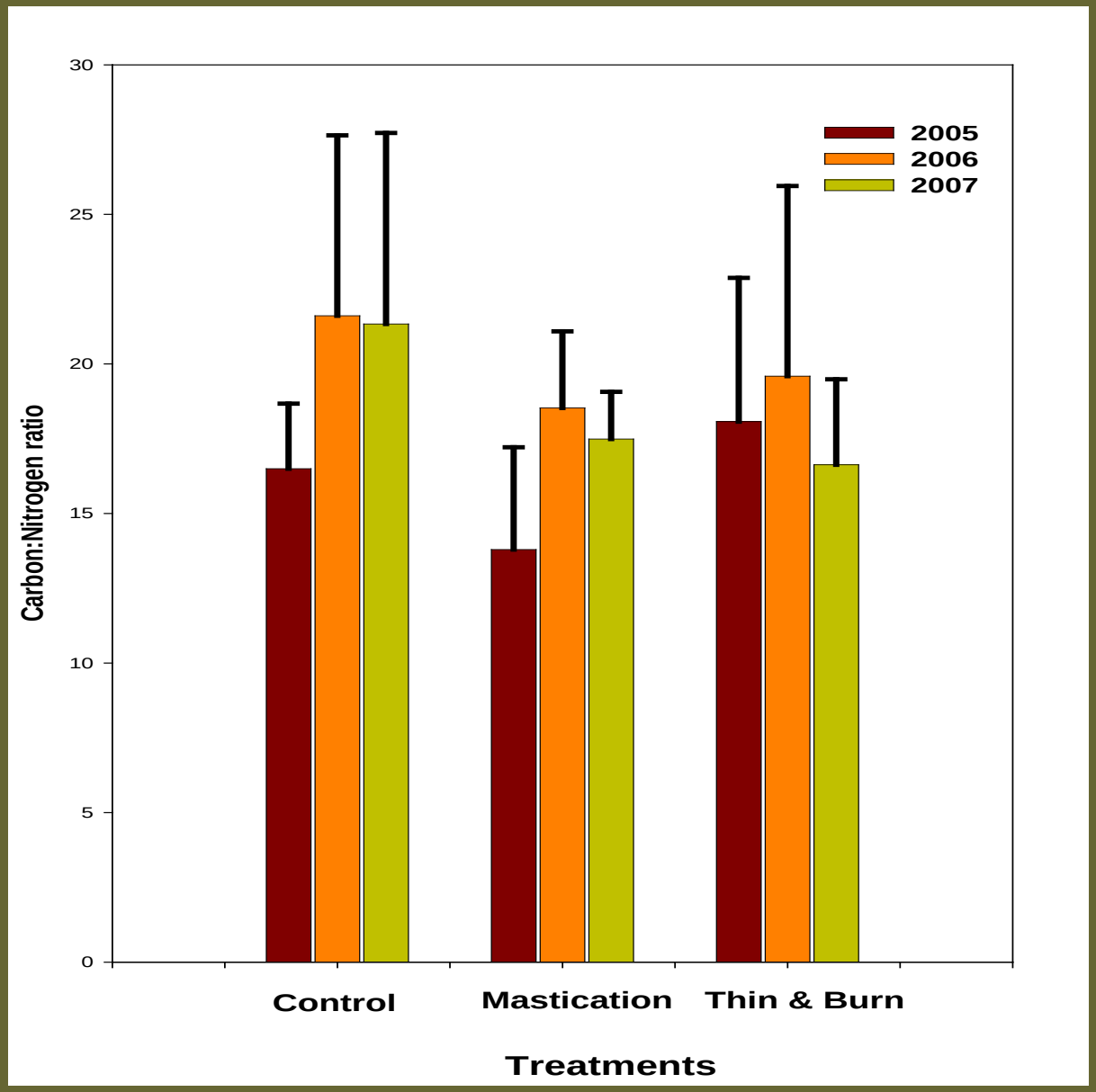
Litter Carbon:Nitrogen ratio at SW Colorado P-J sites



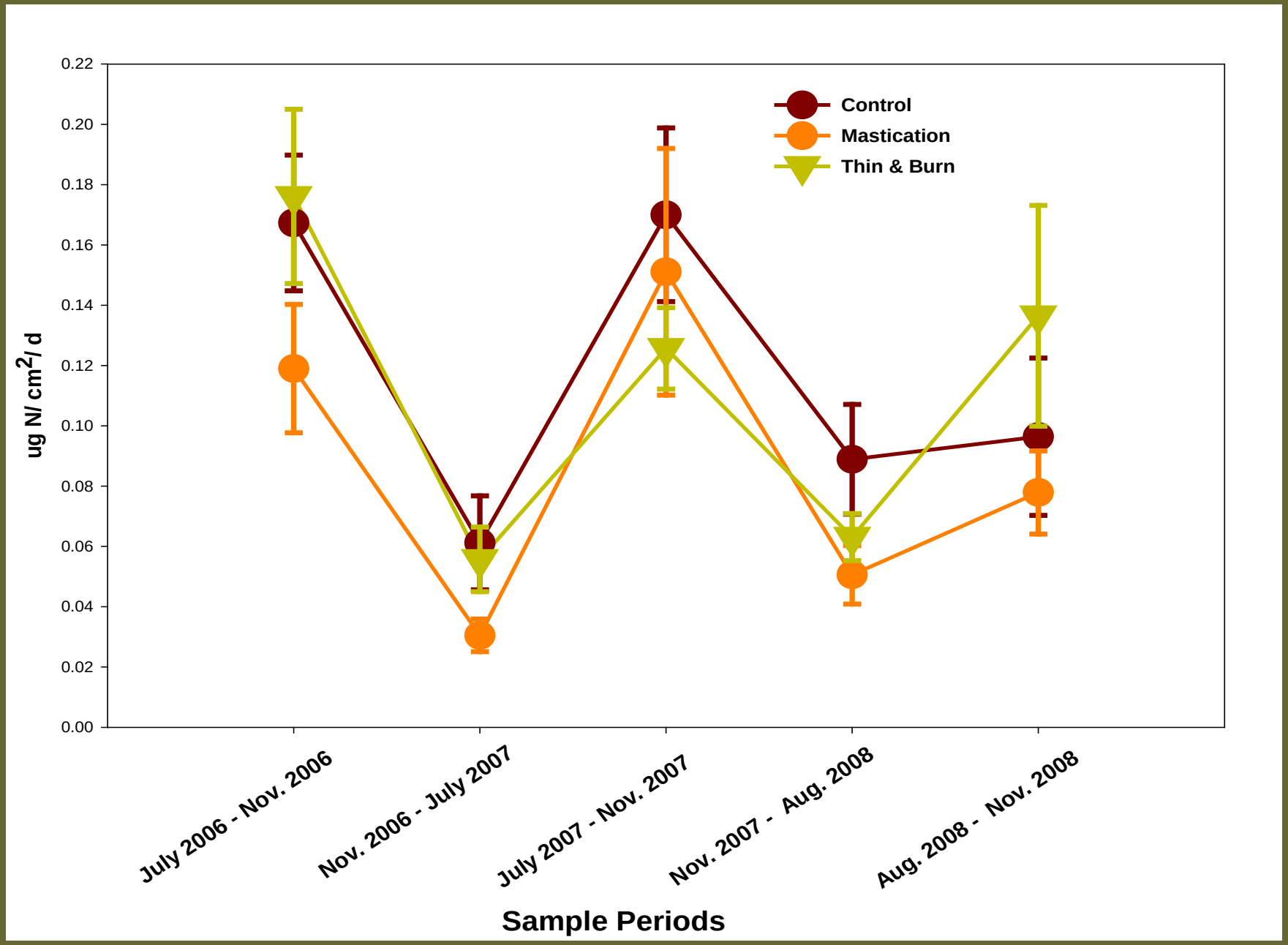
Soil (0-5 cm) Carbon:Nitrogen ratio at SW Colorado P-J sites



Soil (5-15 cm) Carbon:Nitrogen ratio at SW Colorado P-J sites

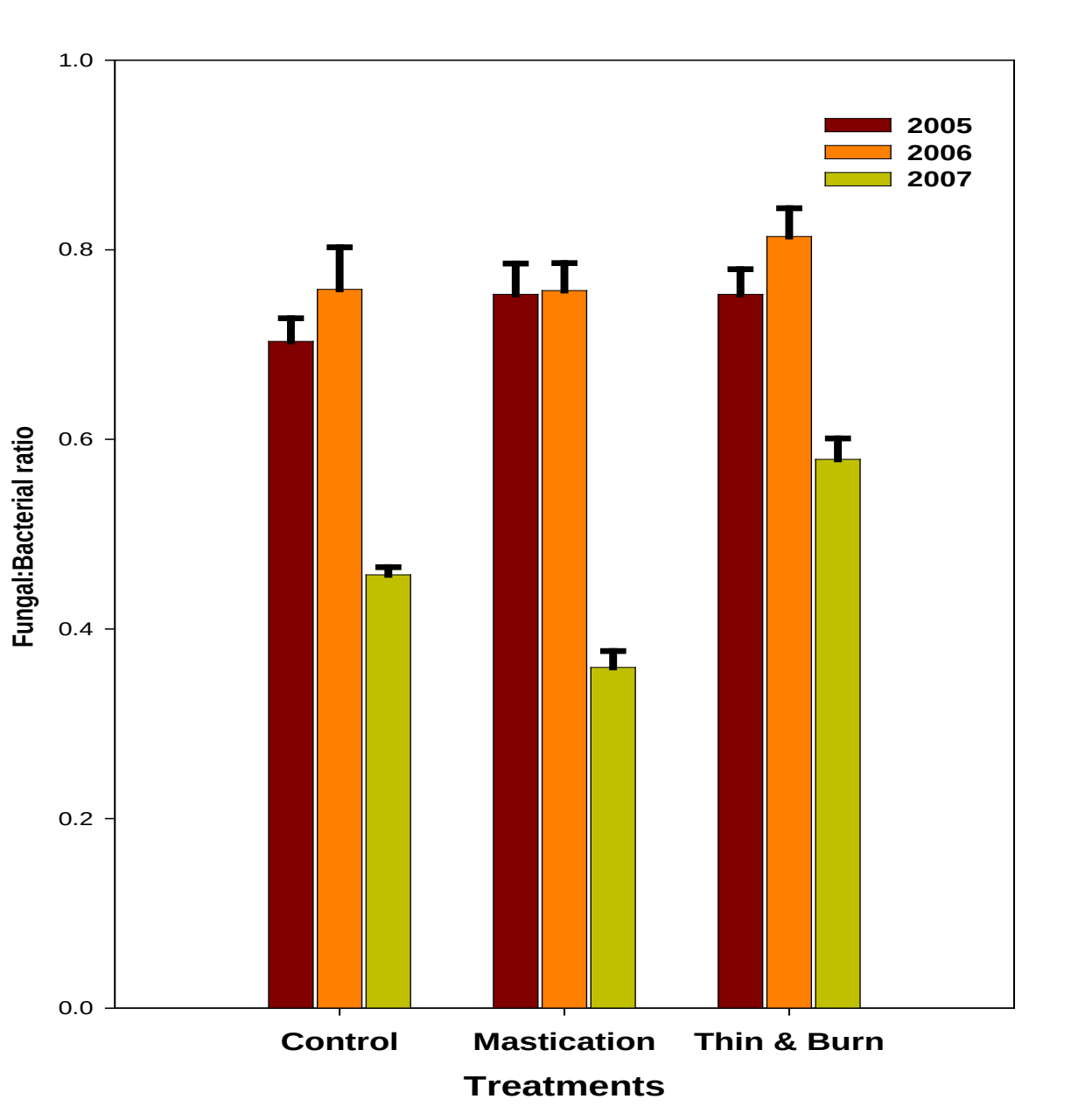


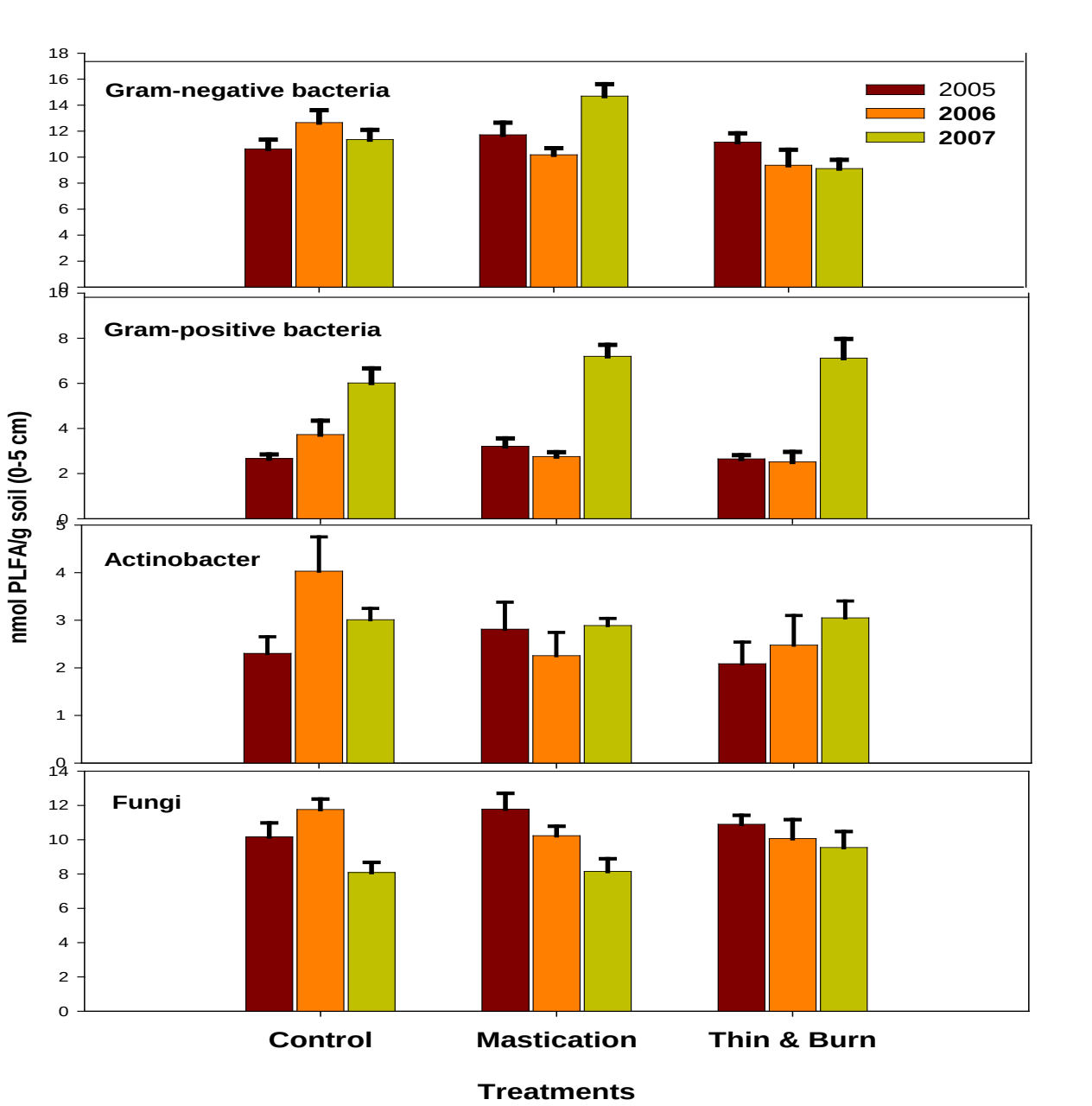
Total N Mineralization at SW Colorado Mastication Study



Multi-response Permutation Procedure of treatment effects on Microbial community structure (PLFA), SW Colorado P-J sites.

	Groups Included in Subset				Simultaneous evaluation Ho: groups are similar
	Mastication	Thin and Burn	Control	Single test p-value	Decision for alpha = 0.05
2005 Pre-treatment	1	1	0	ns	accept
	1	0	1	ns	accept
	0	1	1	ns	accept
2006 Post-treatment	1	1	0	0.0452	reject
	1	0	1	0.0011	reject
	0	1	1	2.38E-04	reject
2007 Post-treatment	1	1	0	4.81E-07	reject
	1	0	1	1.11E-06	reject
	0	1	1	0.0054	reject
2008 Post-treatment	1	1	0	3.54E-04	reject
	1	0	0	1.45E-07	reject
	0	1	1	7.10E-04	reject

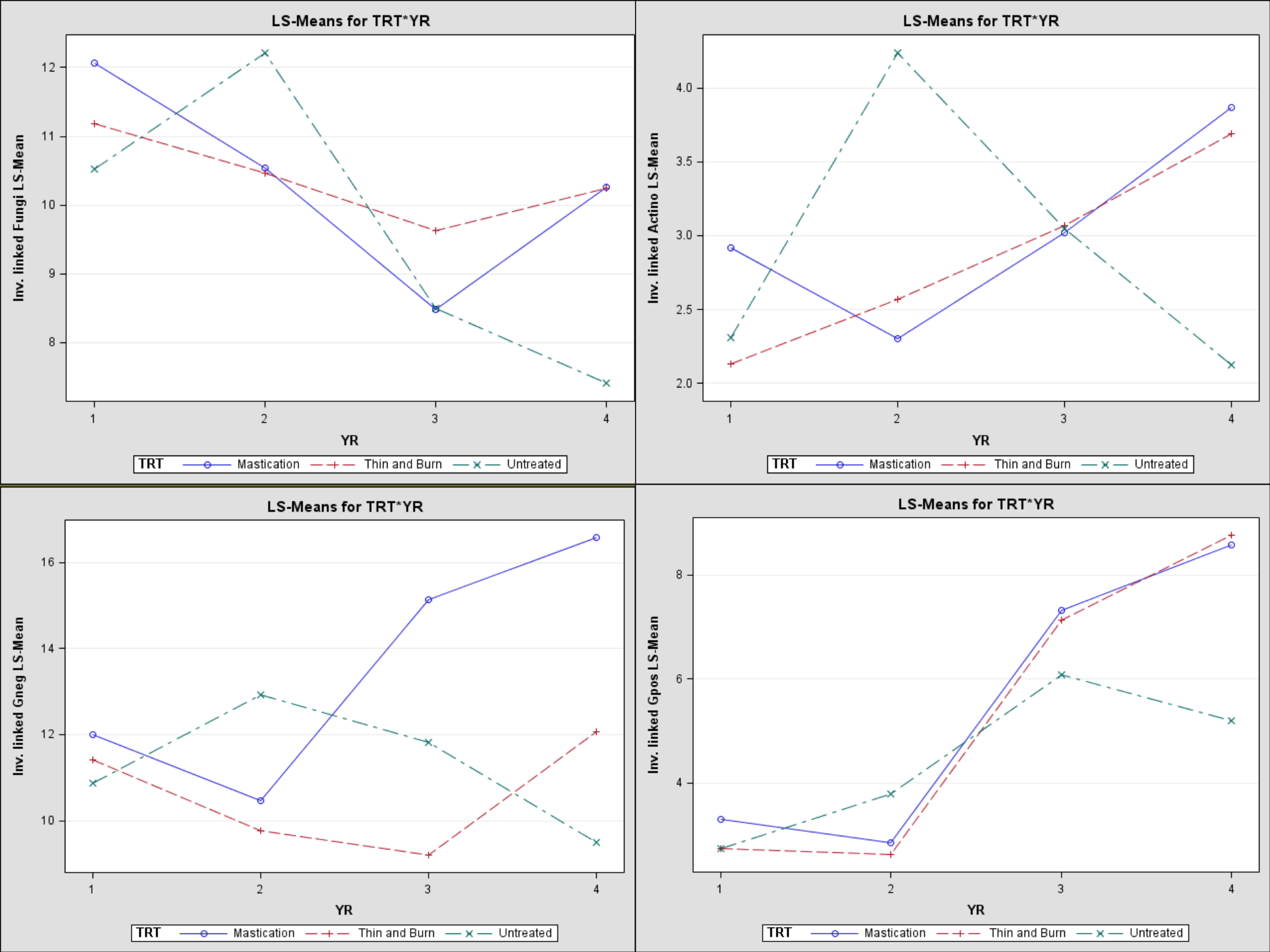

1.0
0.8
0.6
0.4
0.2
0.0
Fungal:Bacterial ratio
2005
2006
2007
Control
Mastication
Thin & Burn
Treatments

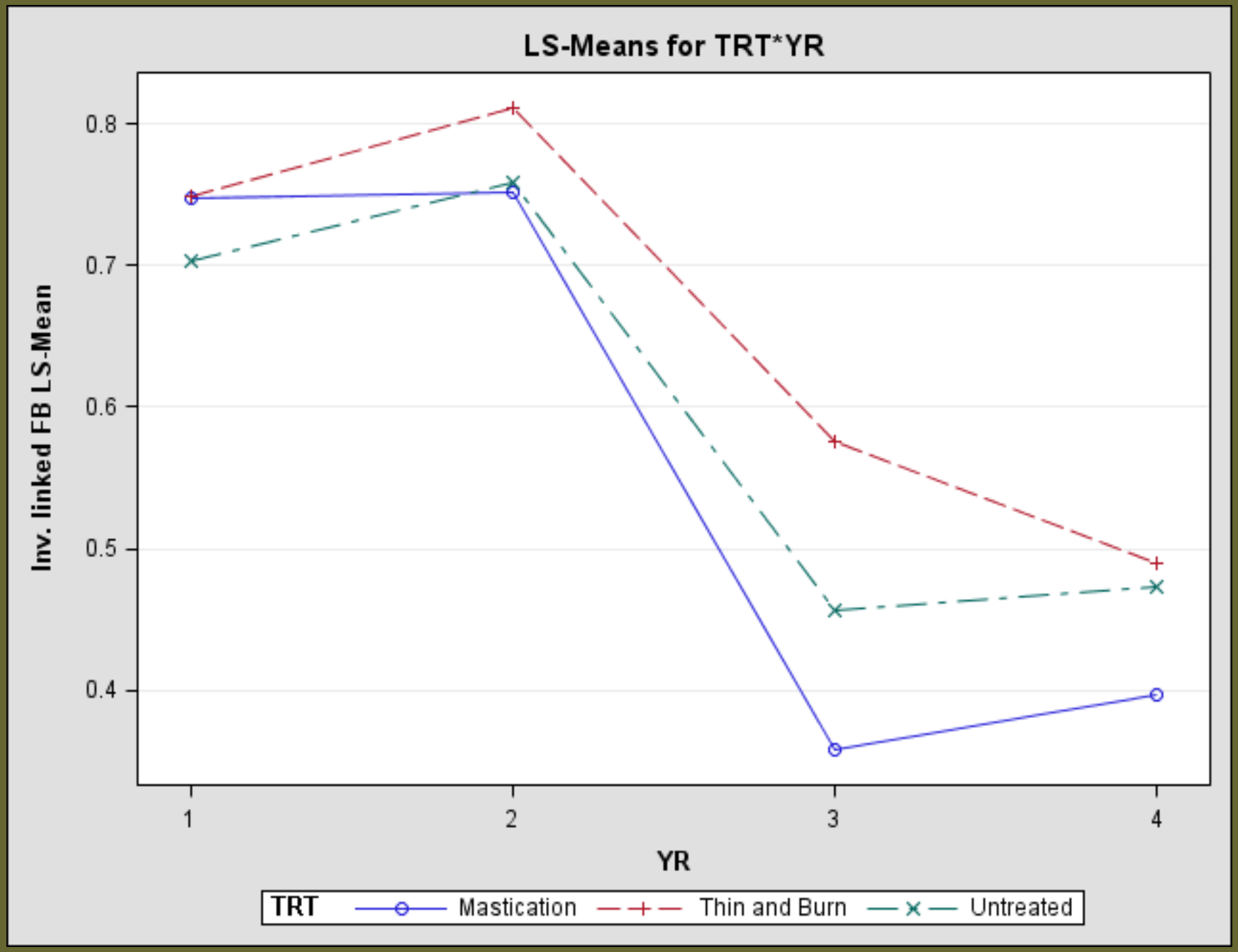

Gram-negative bacteria
2005
2006
2007
Gram-positive bacteria
Actinobacter
Fungi
nmol PLFA/g soil (0-5 cm)
Control
Mastication
Thin & Burn
Treatments

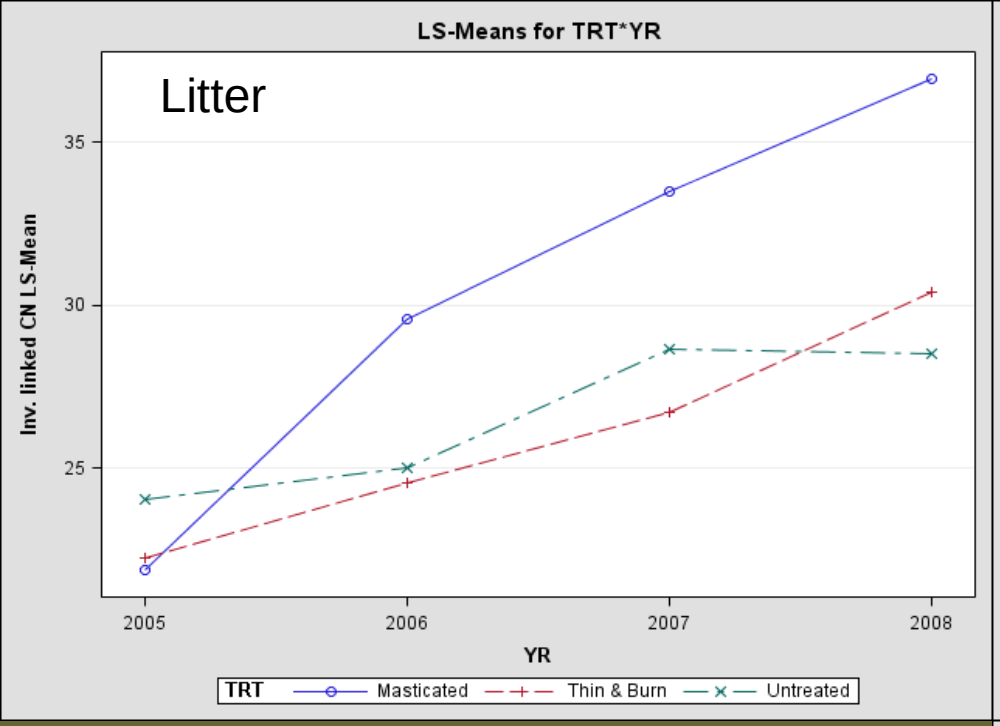
CONCLUSION

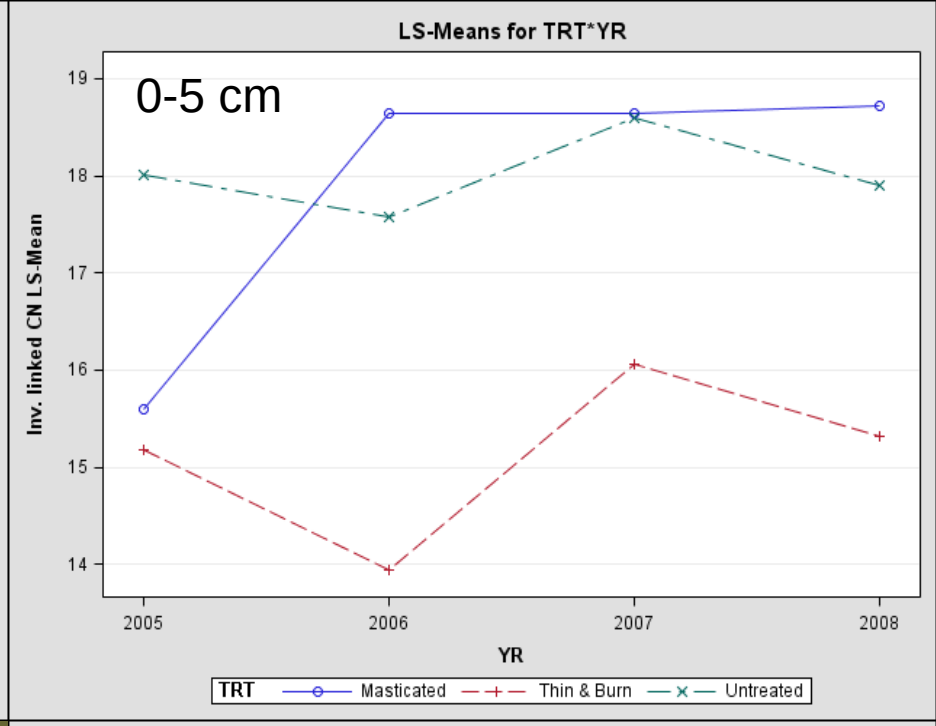
- Mastication did not alter either total carbon or nitrogen concentrations in the litter layer or soil compared to controls or thinning and burning.

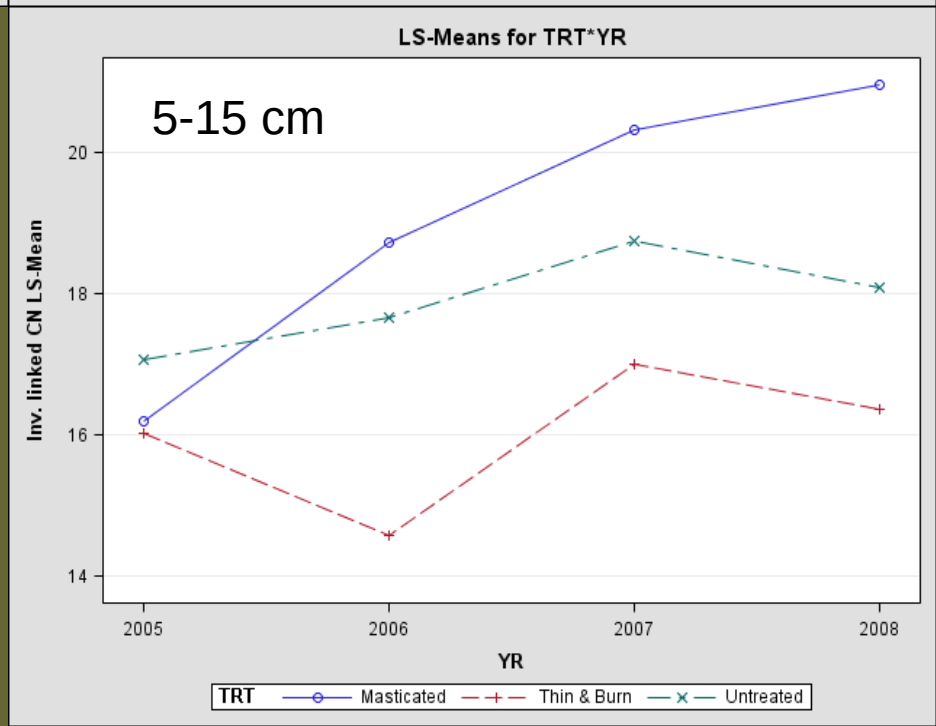
- Mastication did not alter the N mineralization rates in the soil (0-5 cm) compared to controls or thinning and burning

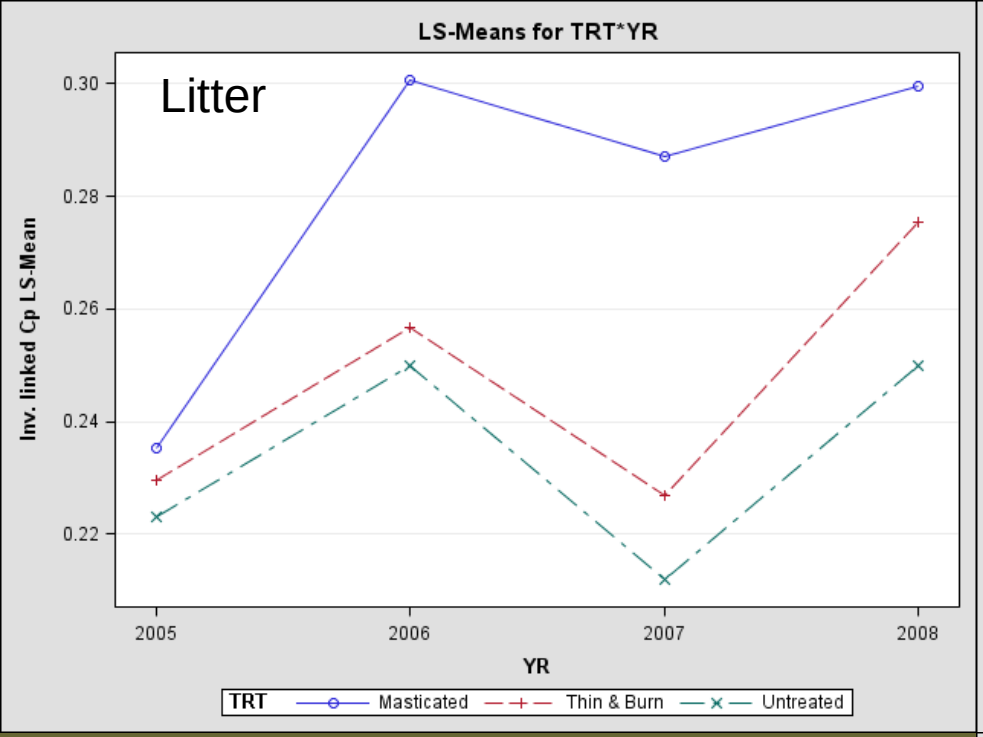

LS-Means for TRT*YR
Inv. linked Fungi LS-Mean
12
11
10
9
8
1
2
3
4
YR
TRT
Mastication
Thin and Burn
Untreated
LS-Means for TRT*YR
Inv. linked Actino LS-Mean
4.0
3.5
3.0
2.5
2.0
1
2
3
4
YR
TRT
Mastication
Thin and Burn
Untreated
LS-Means for TRT*YR
Inv. linked Gneg LS-Mean
16
14
12
10
1
2
3
4
YR
TRT
Mastication
Thin and Burn
Untreated
LS-Means for TRT*YR
Inv. linked Gpos LS-Mean
8
6
4
1
2
3
4
YR
TRT
Mastication
Thin and Burn
Untreated

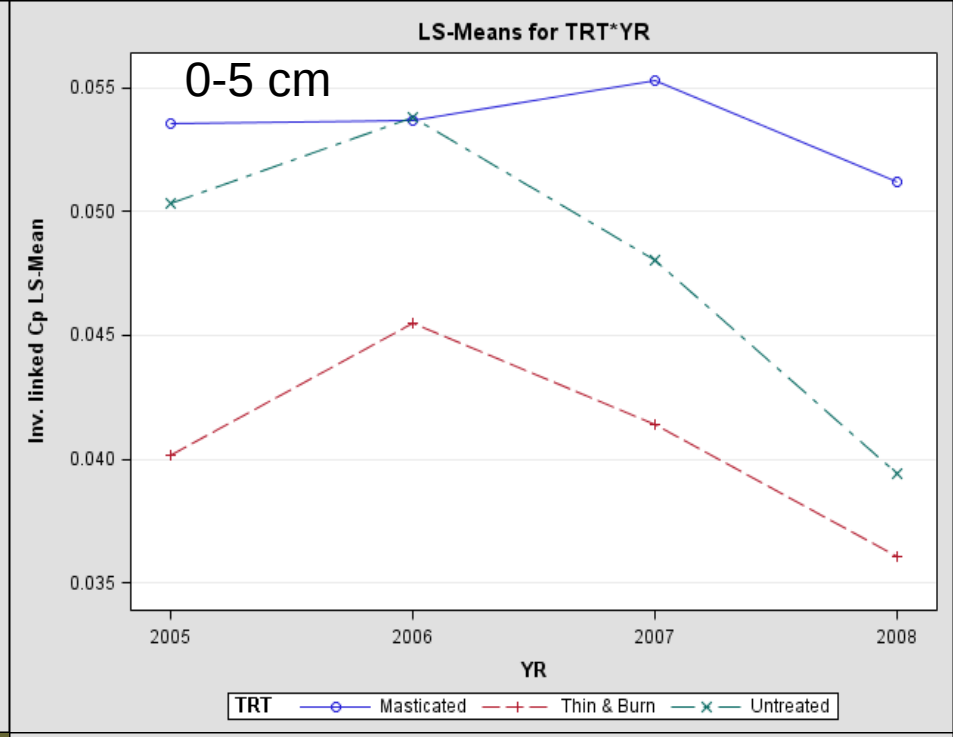

LS-Means for TRT*YR
Inv. linked FB LS-Mean
0.8
0.7
0.6
0.5
0.4
1
2
3
4
YR
TRT
Mastication
Thin and Burn
Untreated

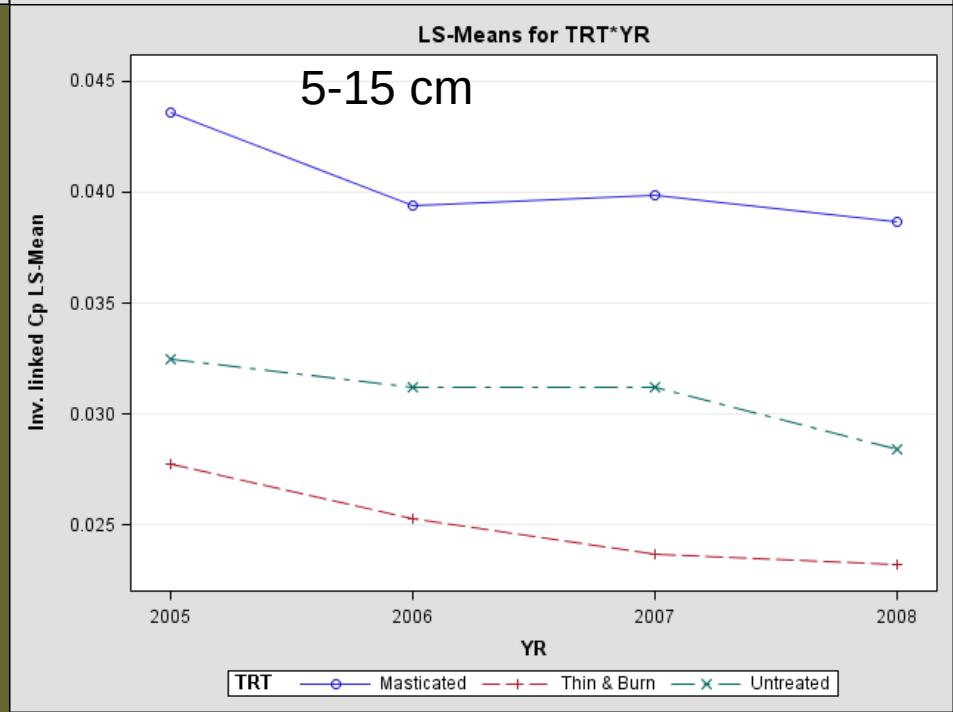

LS-Means for TRT*YR
Litter
Inv. linked CN LS-Mean
35
30
25
2005
2006
2007
2008
YR
TRT
Masticated
Thin & Burn
Untreated

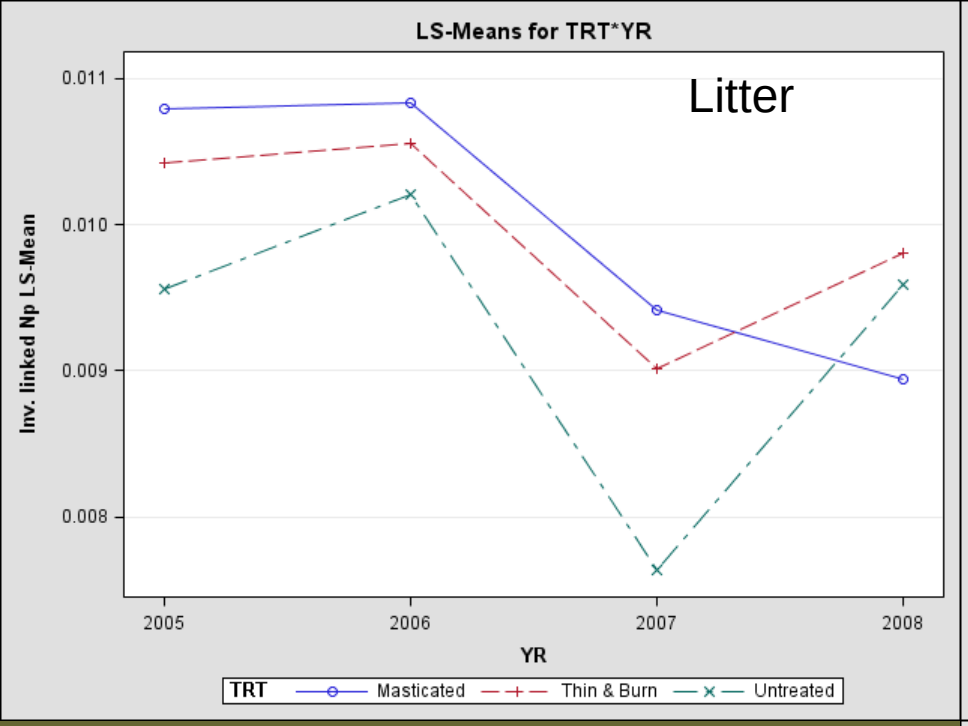

LS-Means for TRT*YR
0-5 cm
Inv. linked CN LS-Mean
19
18
17
16
15
14
2005
2006
2007
2008
YR
TRT
Masticated
Thin & Burn
Untreated

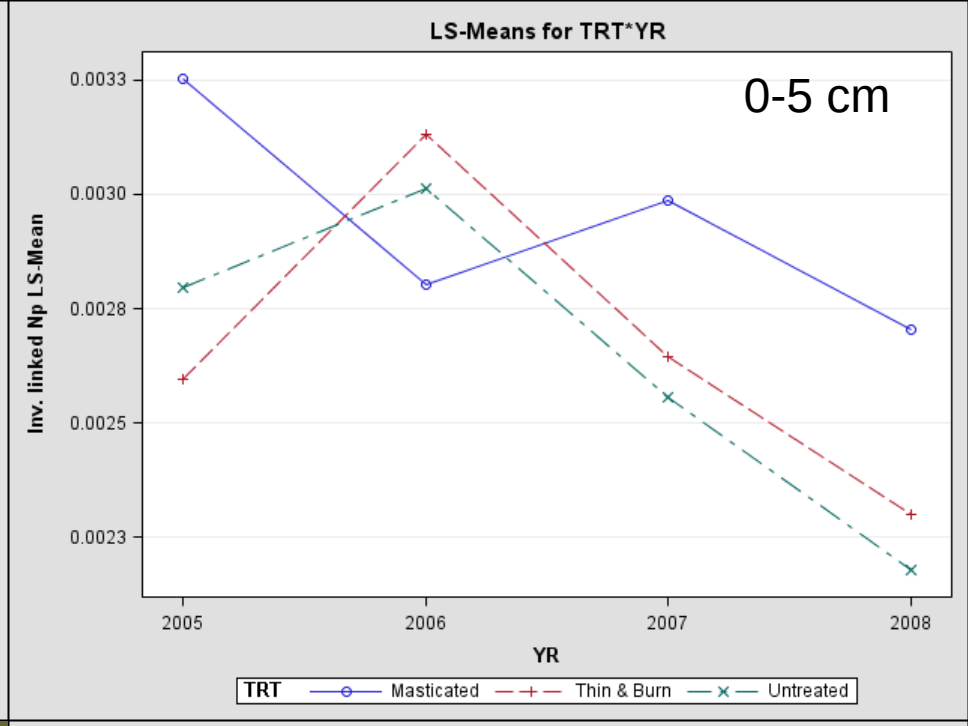

LS-Means for TRT*YR
5-15 cm
Inv. linked CN LS-Mean
20
18
16
14
2005
2006
2007
2008
YR
TRT
Masticated
Thin & Burn
Untreated

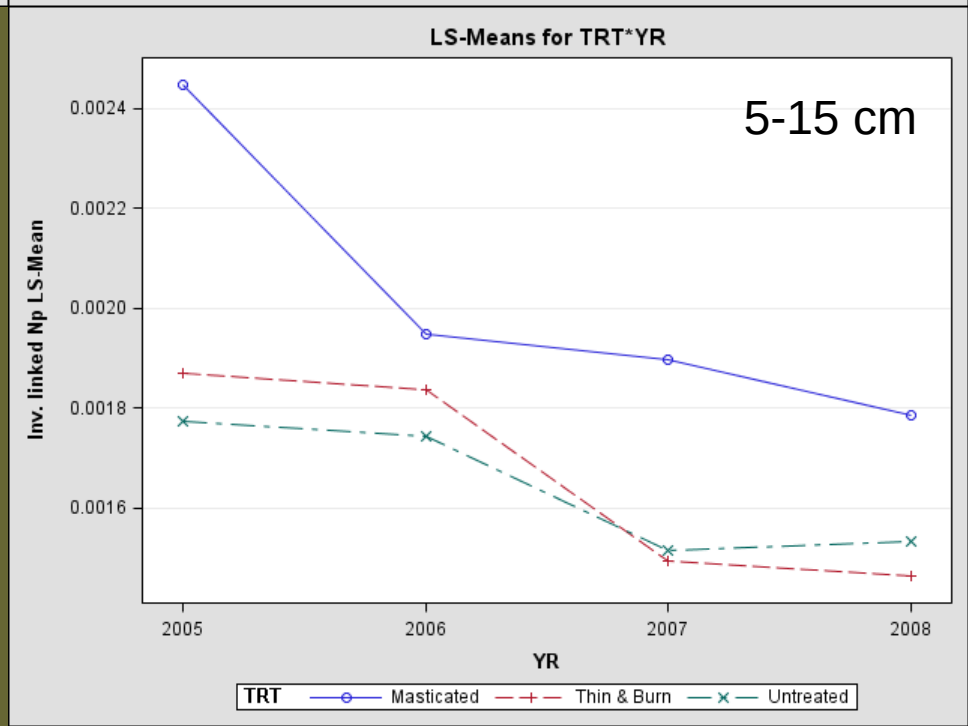

LS-Means for TRT*YR
Litter
Inv. linked Cp LS-Mean
0.30
0.28
0.26
0.24
0.22
2005
2006
2007
2008
YR
TRT
Masticated
Thin & Burn
Untreated


LS-Means for TRT*YR
0-5 cm
Inv. linked Cp LS-Mean
0.055
0.050
0.045
0.040
0.035
2005
2006
2007
2008
YR
TRT
Masticated
Thin & Burn
Untreated

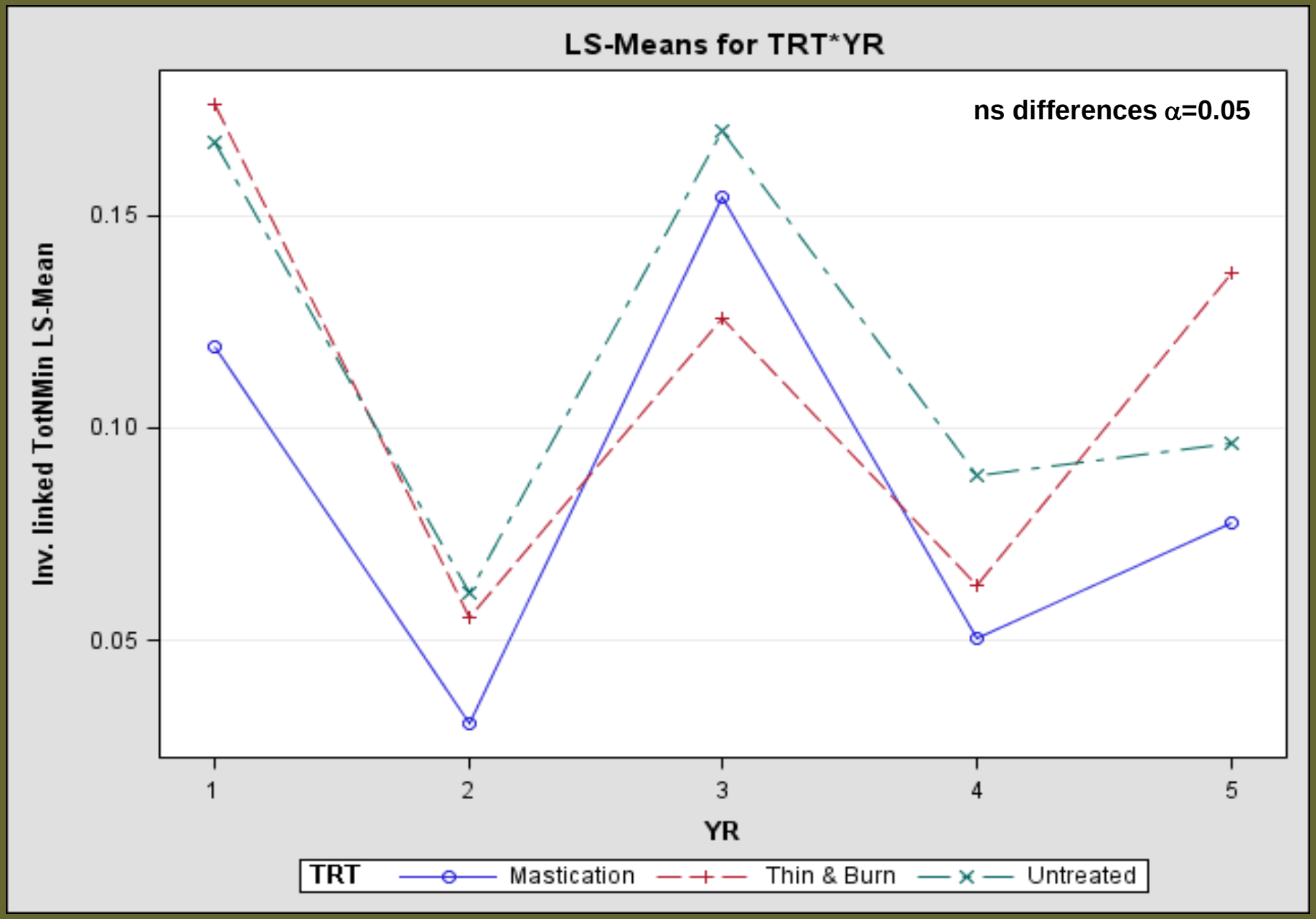

LS-Means for TRT*YR
5-15 cm
Inv. linked Cp LS-Mean
0.045
0.040
0.035
0.030
0.025
2005
2006
2007
2008
YR
TRT
Masticated
Thin & Burn
Untreated

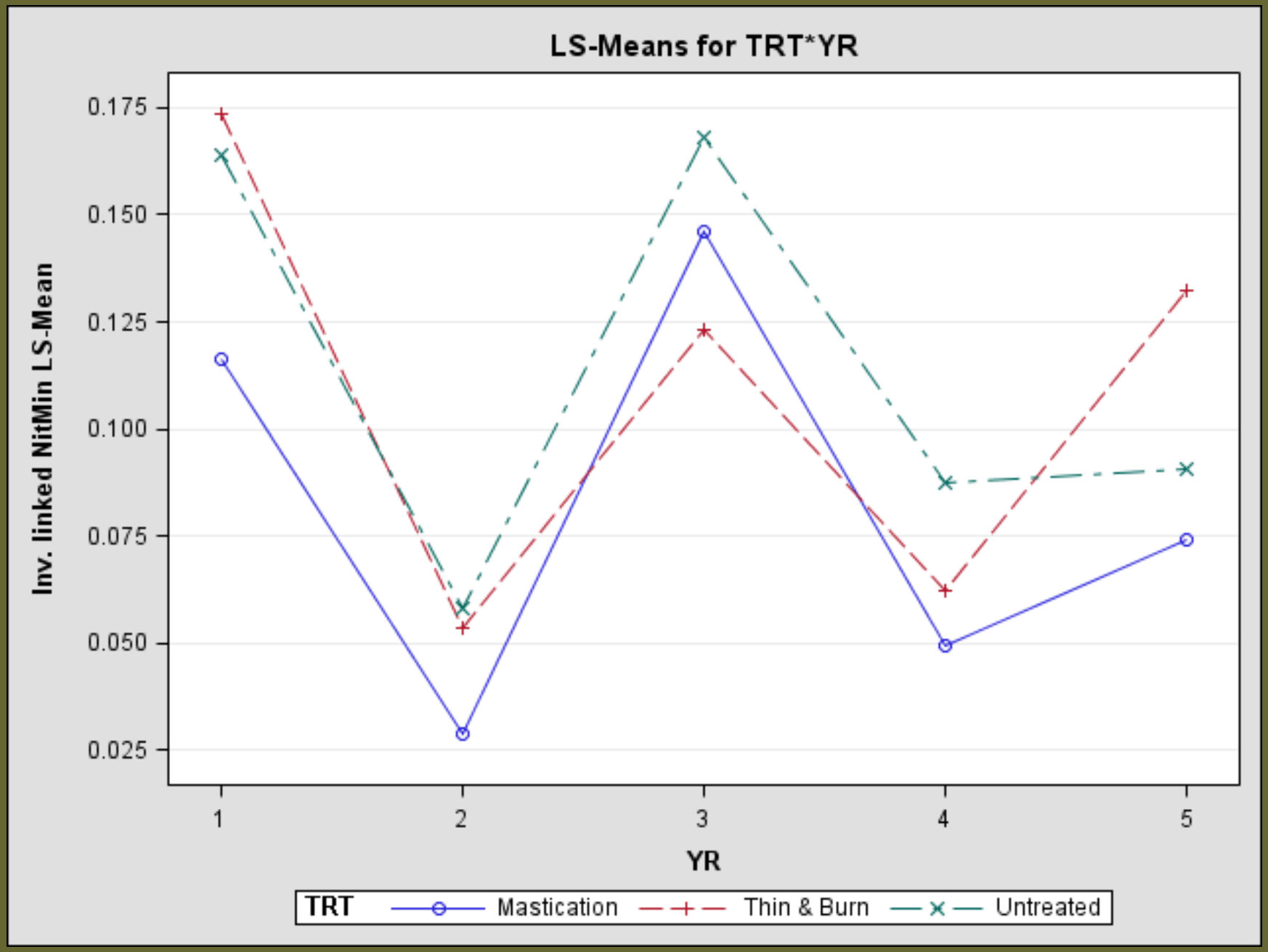

LS-Means for TRT*YR
Litter
Inv. linked Np LS-Mean
0.011
0.010
0.009
0.008
2005
2006
2007
2008
YR
TRT
Masticated
Thin & Burn
Untreated

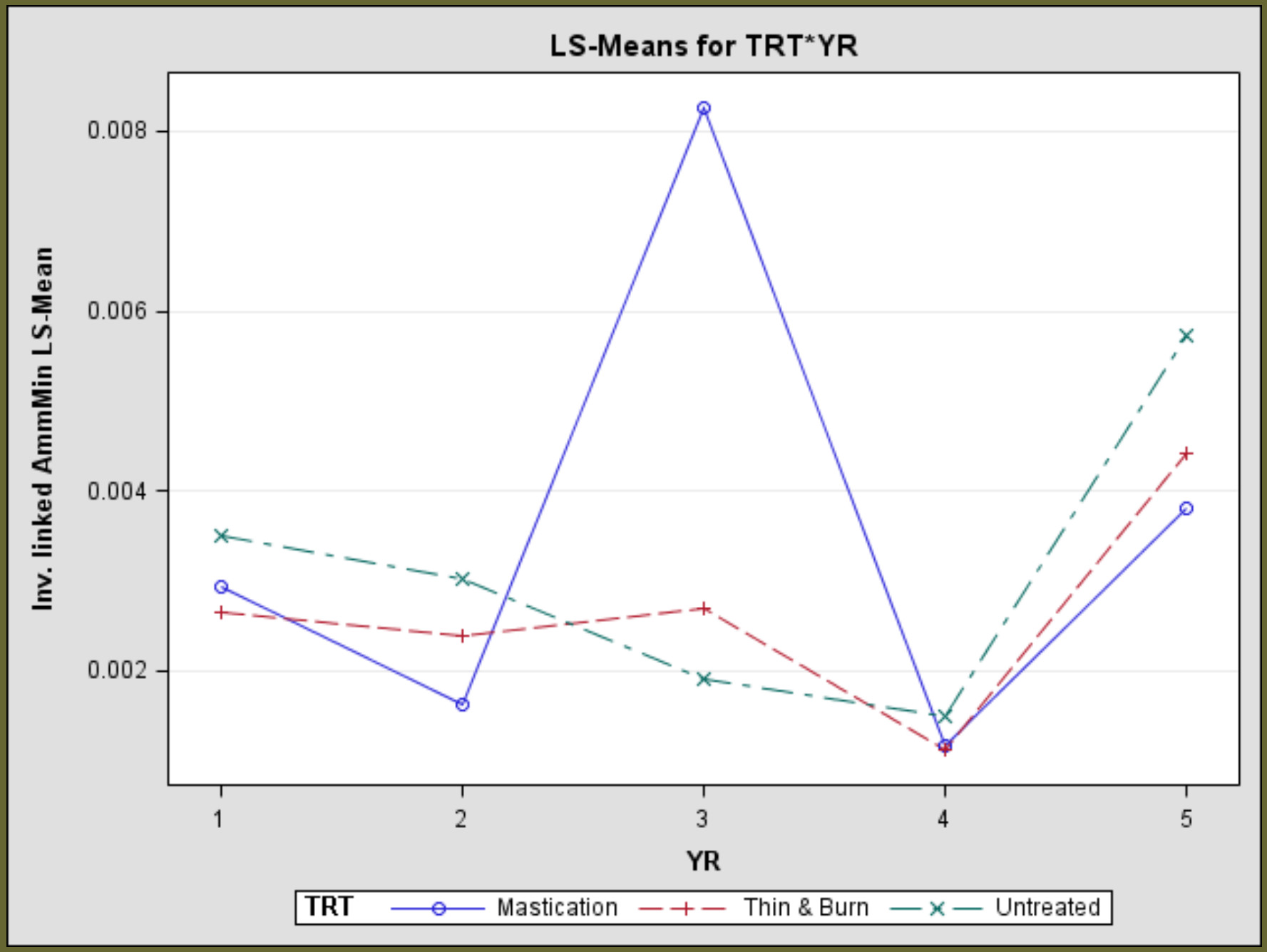

LS-Means for TRT*YR
0-5 cm
Inv. linked Np LS-Mean
0.0033
0.0030
0.0028
0.0025
0.0023
2005
2006
2007
2008
YR
TRT
Masticated
Thin & Burn
Untreated


LS-Means for TRT*YR
5-15 cm
Inv. linked Np LS-Mean
0.0024
0.0022
0.0020
0.0018
0.0016
2005
2006
2007
2008
YR
TRT
Masticated
Thin & Burn
Untreated

Total Nitrogen Mineralization (ug N / 0-5 cm mineral soil / day)




LS-Means for TRT*YR
Inv. linked NitMin LS-Mean
0.175
0.150
0.125
0.100
0.075
0.050
0.025
1
2
3
4
5
YR
TRT
Mastication
Thin & Burn
Untreated


LS-Means for TRT*YR
Inv. linked AmmMin LS-Mean
0.008
0.006
0.004
0.002
1
2
3
4
5
YR
TRT
Mastication
Thin & Burn
Untreated