E4 manuscript Results - Using ggplot

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Filename: e4_ms_results.Rmd'

A. This code needs the following files:

1. *'e4Data' folder*

- 'e4_potData.txt'
- 'e4_potData_dictionary.txt'

2. *'e4Code' folder*

- 'e4_cleanCode.R'
- 'e4_calcsiCode.R'
- 'mytheme.R'
- 'statFxns.R'
- 'e4_Fig2stats.R' and 'e4_makeFig2.R' –> both reference –> 'e4_prepdfFig2.R'
- 'e4_Fig3stats.R' and 'e4_makeFig3.R' –> both reference –> 'e4_prepdfFig3n4.R'
- 'e4_Fig4stats.R' and 'e4_makeFig4.R' –> both reference –> 'e4_prepdfFig3n4.R'
- 'e4_Fig5stats.R' and 'e4_makeFig5.R' –> both reference –> 'e4_prepdfFig5.R'

B. This code does the following things:

1. Clean raw dataset (run external code)
2. *'e4Output_figures' folder* has Results section figures
    - Fig2. Species' biomass
    - Fig3. Soil measures vs Pot monoculture type
    - Fig4. Soil measures vs M.v. biomass w/o neighbors
    - Fig5. Soil measures vs M.v. biomass w/ neighbors, vs relative Mv abundance, vs total biomass
3. *'e4Output_tables' folder'* has txt tables that hold anova results and mean values

C. R-related citations

```
citation()
```

```
##
## To cite R in publications use:
##
##   R Core Team (2014). R: A language and environment for
##   statistical computing. R Foundation for Statistical Computing,
##   Vienna, Austria. URL http://www.R-project.org/.
##
## A BibTeX entry for LaTeX users is
##
```

```
##   @Manual{,
##     title = {R: A Language and Environment for Statistical Computing},
##     author = {{R Core Team}},
##     organization = {R Foundation for Statistical Computing},
##     address = {Vienna, Austria},
##     year = {2014},
##     url = {http://www.R-project.org/},
##   }
##
## We have invested a lot of time and effort in creating R, please
## cite it when using it for data analysis. See also
## 'citation("pkgname")' for citing R packages.
```

```
citation("lme4")
```

```
##
## Bates D, Maechler M, Bolker B and Walker S (2014). _lme4: Linear
## mixed-effects models using Eigen and S4_. R package version 1.1-7,
## <URL: http://CRAN.R-project.org/package=lme4>.
##
## Bates D, Maechler M, Bolker BM and Walker S (2014). "lme4: Linear
## mixed-effects models using Eigen and S4." ArXiv e-print; submitted
## to _Journal of Statistical Software_, <URL:
## http://arxiv.org/abs/1406.5823>.
```

```
citation("lmerTest")
```

```
##
## To cite package 'lmerTest' in publications use:
##
##   Alexandra Kuznetsova, Per Bruun Brockhoff and Rune Haubo Bojesen
##   Christensen (2014). lmerTest: Tests for random and fixed effects
##   for linear mixed effect models (lmer objects of lme4 package)..
##   R package version 2.0-11.
##   http://CRAN.R-project.org/package=lmerTest
##
## A BibTeX entry for LaTeX users is
##
##   @Manual{,
##     title = {lmerTest: Tests for random and fixed effects for linear mixed effect
## models (lmer objects of lme4 package).},
##     author = {Alexandra Kuznetsova and Per {Bruun Brockhoff} and Rune {Haubo Bojesen Christensen}},
##     year = {2014},
##     note = {R package version 2.0-11},
##     url = {http://CRAN.R-project.org/package=lmerTest},
##   }
```

1. Clean raw dataset (run external code)

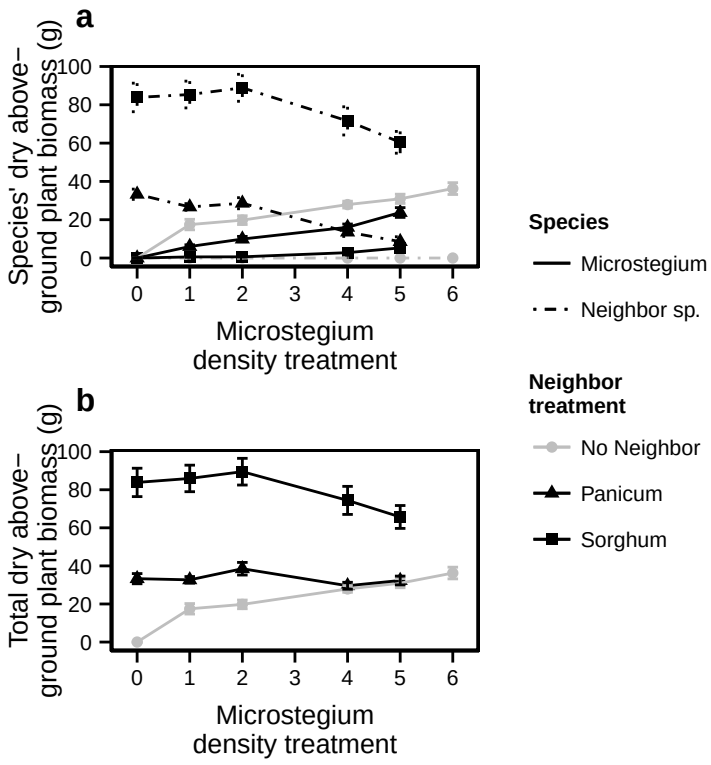
```
source('e4Code/e4_cleanCode.R')
#str(data)

### Read-in all the custom functions for doing stats ###
source('e4Code/statFxns.R')
```

---

2. Plot

Fig2 : Plant biomasses vs density trt

```
source('e4Code/e4_Fig2stats.R')
source('e4Code/e4_makeFig2.R')
fig2
```



e4Output_tables/fig2_means.txt – **Figure 2 Means**

e4Output_tables/fig2_lme_anova.txt – **Microstegium biomass, relative abundance, and total plant biomass were shaped by the density treatment, neighbor treatment, and their interaction**

Microstegium biomass and relative abundance were X to X times lower in the presence of Sorghum than Panicum across density treatments (Fig 2)

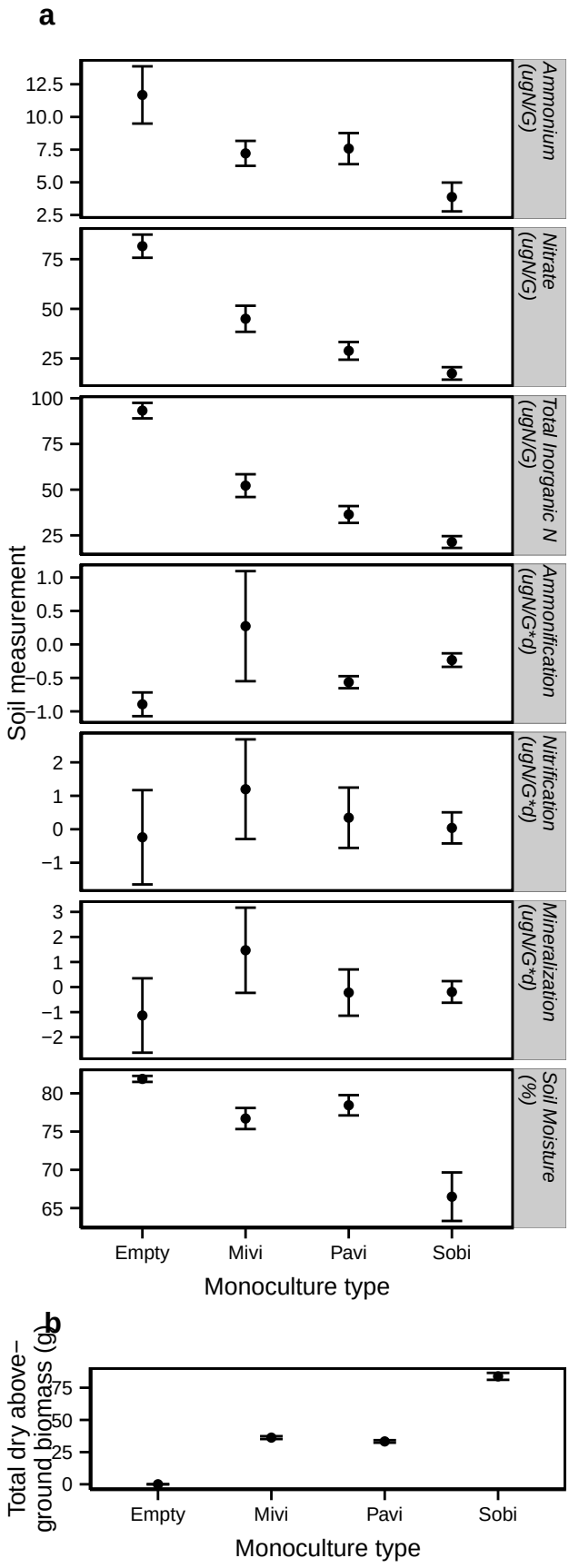
```
##   INNERID XgreaterthanNP XgreaterthanPS
## 1       1       2.905826      10.505245
## 2       2       1.997375      16.128664
## 3       4       1.738686       5.727240
## 4       5       1.301545       4.490833
```

Pots with Sorghum also had X to X times more total plant biomass than those given the Panicum neighbor treatment and X to X times more total plant biomass than the no neighbor treatment (Fig 2)

```
##   INNERID XgreaterthanPN XgreaterthanSP
## 1       1       1.871588       2.629804
## 2       2       1.946967       2.323700
## 3       4       1.060591       2.515111
## 4       5       1.045528       2.032164
```

Fig3 : Monocultures vs total biomass and soil measurements

```
source('e4Code/e4_Fig3stats.R')
source('e4Code/e4_makeFig3.R')
fig3
```


a
Ammonium (ugN/G)
Nitrate (ugN/G)
Total Inorganic N (ugN/G)
Ammonification (ugN/G*d)
Nitrification (ugN/G*d)
Mineralization (ugN/G*d)
Soil Moisture (%)
Soil measurement
Empty
Mivi
Pavi
Sobi
Monoculture type
b
Total dry above−ground biomass (g)
Empty
Mivi
Pavi
Sobi
Monoculture type

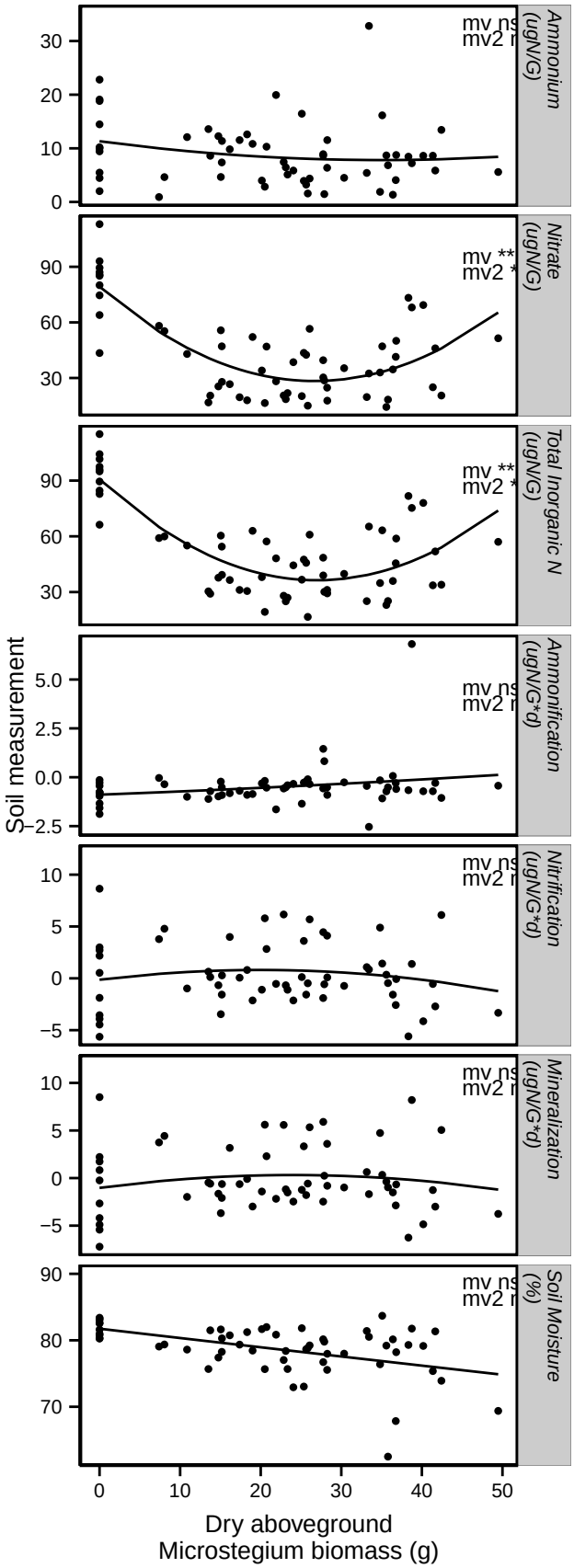
e4Output_tables/fig3a_means.txt – **Figure 3a Means**

e4Output_tables/fig3b_means.txt – **Figure 3b Means**

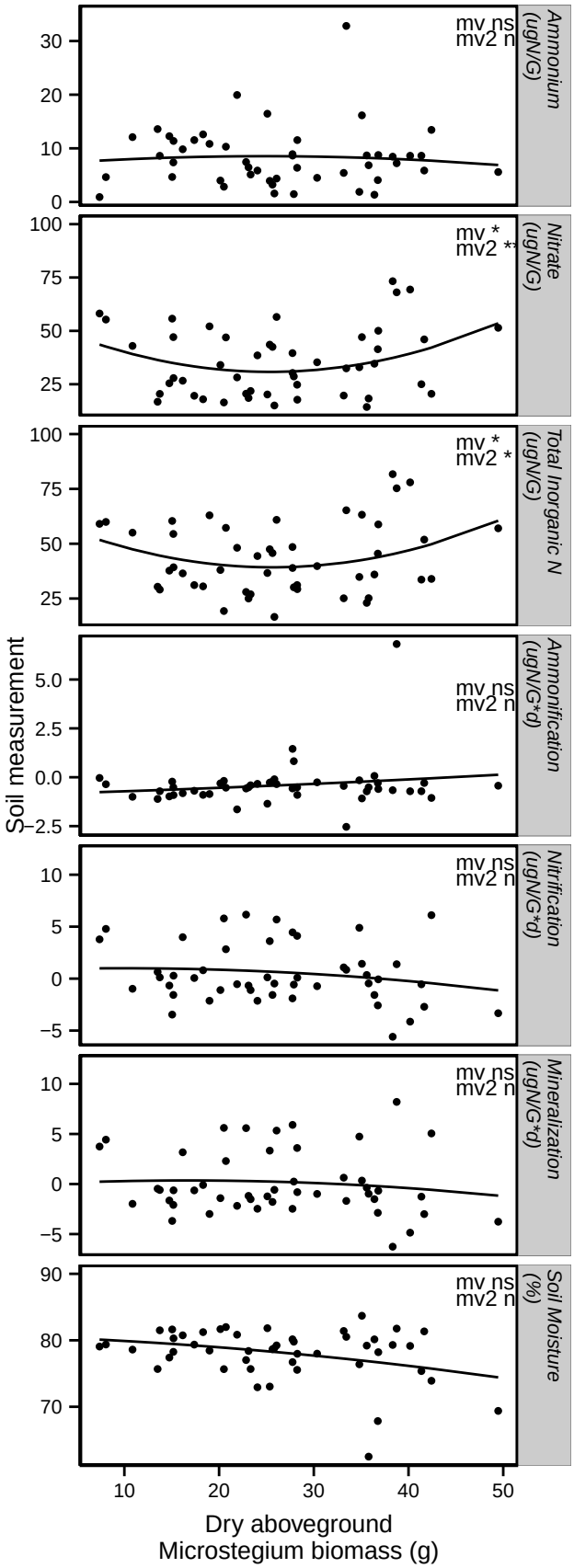
e4Output_tables/fig3_lme_anova.txt – **Soil measures and total biomass were shaped by the plant type**

Fig4 : Mivi biomass vs soil measures w/o neighbors

```
source('e4Code/e4_Fig4stats.R')
source('e4Code/e4_makeFig4.R')
fig4.text
```


Ammonium (ugN/G)
Nitrate (ugN/G)
Total Inorganic N (ugN/G)
Ammonification (ugN/G*d)
Nitrification (ugN/G*d)
Mineralization (ugN/G*d)
Soil Moisture (%)
Soil measurement
Dry aboveground Microstegium biomass (g)

```
fig4.text.noempty
```


Ammonium (ugN/G)
mv ns
mv2 n
Nitrate (ugN/G)
mv *
mv2 **
Total Inorganic N (ugN/G)
mv *
mv2 *
Ammonification (ugN/G*d)
mv ns
mv2 n
Nitrification (ugN/G*d)
mv ns
mv2 n
Mineralization (ugN/G*d)
mv ns
mv2 n
Soil Moisture (%)
mv ns
mv2 n
Soil measurement
Dry aboveground
Microstegium biomass (g)

***e4Output_tables/fig4_lme_anova.txt* and *e4Output_tables/fig4_lme_fe.txt* – Soil measures varied by Mivi**

```
##          rownames  .id Estimate Std..Error    df t.value Pr...t..
## nodi1 (Intercept) nodi    79.24       4.86 30.04   16.29        0
## nodi2        mivi nodi    -3.81       0.39 47.40   -9.70        0
## nodi3   I(mivi^2) nodi     0.07       0.01 48.03    7.76        0
```

```
##          rownames  .id Estimate Std..Error    df t.value Pr...t..
## nodi1 (Intercept) nodi    56.19      11.23 44.41    5.00     0.00
## nodi2        mivi nodi    -2.00       0.84 38.86   -2.37     0.02
## nodi3   I(mivi^2) nodi     0.04       0.02 38.92    2.56     0.01
```

```
##           rownames   .id Estimate Std..Error    df t.value Pr...t..
## totdi1 (Intercept) totdi    90.61       4.70 34.03   19.30        0
## totdi2        mivi totdi    -4.02       0.40 47.59  -10.11        0
## totdi3   I(mivi^2) totdi     0.07       0.01 48.35    8.01        0
```

```
##           rownames   .id Estimate Std..Error    df t.value Pr...t..
## totdi1 (Intercept) totdi    63.92      12.01 44.09    5.32     0.00
## totdi2        mivi totdi    -1.92       0.91 39.42   -2.11     0.04
## totdi3   I(mivi^2) totdi     0.04       0.02 39.49    2.26     0.03
```

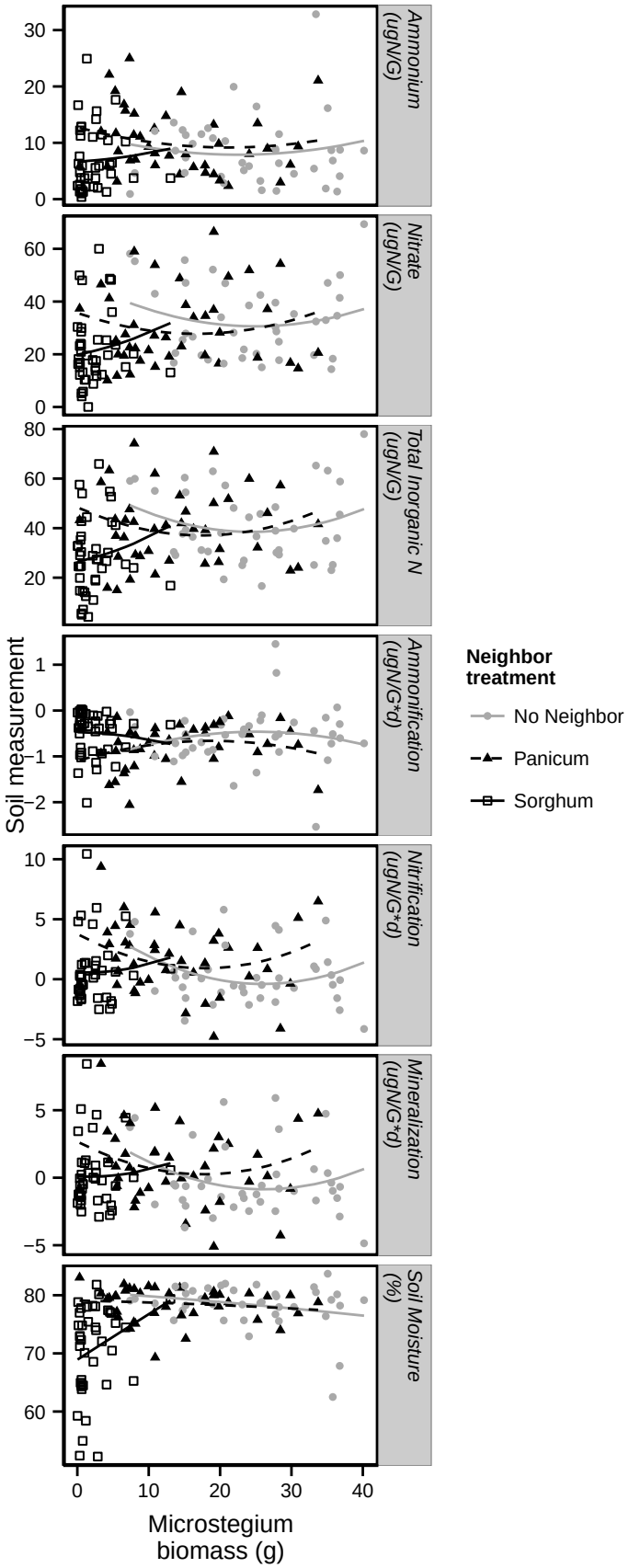
Fig5. Mixture plant biomass vs soil measures

- Exclude pots without 2 species present

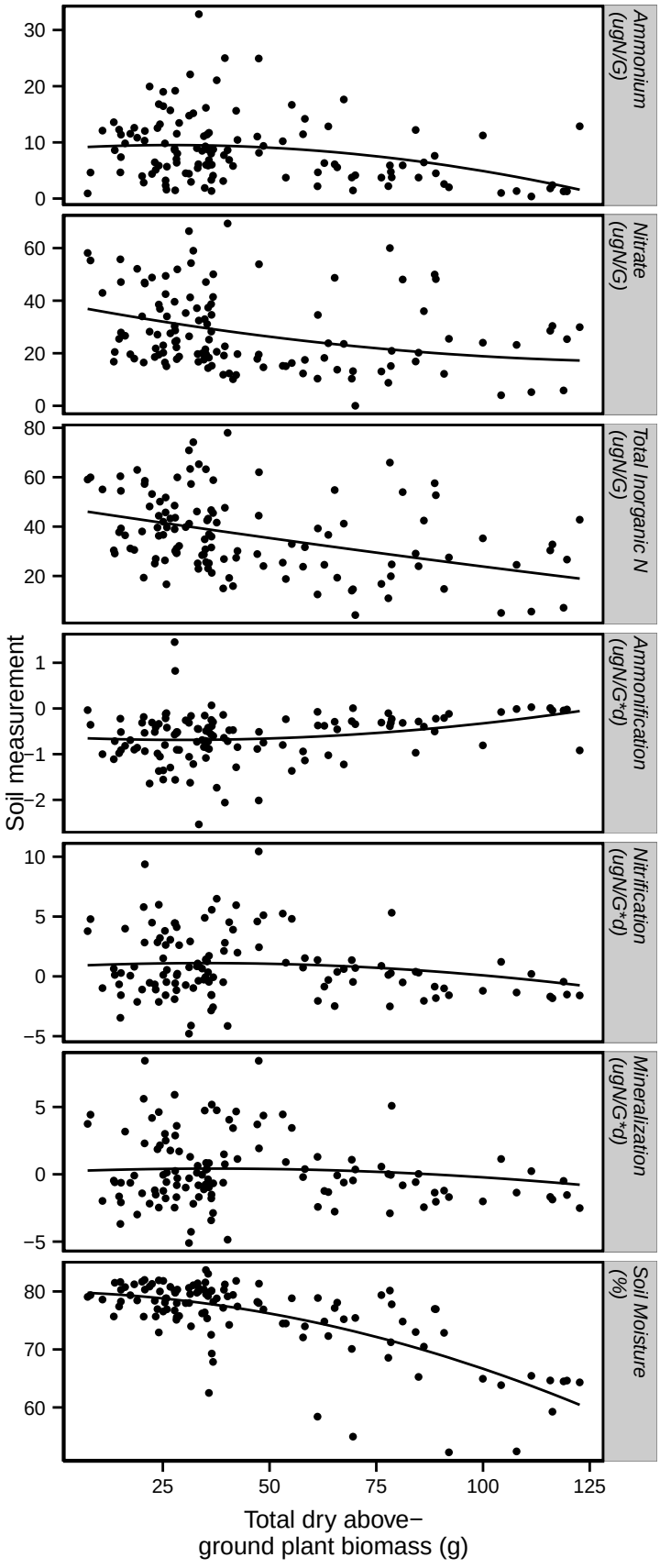
```
source('e4Code/e4_Fig5stats.R')
warnings()
```

```
## NULL
```

```
source('e4Code/e4_makeFig5.R')
fig5
```


Ammonium (ugN/G)
Nitrate (ugN/G)
Total Inorganic N (ugN/G)
Ammonification (ugN/G*d)
Nitrification (ugN/G*d)
Mineralization (ugN/G*d)
Soil Moisture (%)
Soil measurement
Microstegium biomass (g)
Neighbor treatment
No Neighbor
Panicum
Sorghum

```
fig6
```


Ammonium (ugN/G)
Nitrate (ugN/G)
Total Inorganic N (ugN/G)
Ammonification (ugN/G*d)
Nitrification (ugN/G*d)
Mineralization (ugN/G*d)
Soil Moisture (%)
Soil measurement
Total dry above−
ground plant biomass (g)

e4Output_tables/fig5_lme_mivi_anova.txt **and** ***e4Output_tables/fig5_lme_mivi_fe.txt*** **– Soil measures varied by mivi and comptrt**

e4Output_tables/fig5_lme_total_anova.txt **and** ***e4Output_tables/fig5_lme_total_fe.txt*** **– Soil measures varied by total biomass**

e4Output_tables/fig5_means.txt **– Mean soil measurement values by comptrt in mvtrt=1,2,4,5**
