ModBuckBRIXBoth.R

Audrey McCombs

Sun Nov 27 19:33:06 2016

```
library(ggplot2)
library(lme4)
```

```
## Loading required package: Matrix
```

```
library(nlme)
```

```
##
## Attaching package: 'nlme'
```

```
## The following object is masked from 'package:lme4':
##
##     lmList
```

```
library(lsmeans)
```

```
## Warning: package 'lsmeans' was built under R version 3.2.5
```

```
## Loading required package: estimability
```

```
## Warning: package 'estimability' was built under R version 3.2.5
```

```
library(lubridate)
```

```
## Warning: package 'lubridate' was built under R version 3.2.5
```

```
##
## Attaching package: 'lubridate'
```

```
## The following object is masked from 'package:base':
##
##     date
```

```
library(multcompView)
```

```
## Warning: package 'multcompView' was built under R version 3.2.5
```

```
library(car)
```

```
## Warning: package 'car' was built under R version 3.2.5
```

```r
setwd("D:/Iowa State University/Debinski Lab/Nectar data/MAL")

bucksug15 <- read.csv("nectar analysis/data files/bucksugar15.csv", header = T)
bucksug16 <- read.csv("nectar analysis/data files/bucksugar16.csv", header = T)
bucksugboth <- rbind(bucksug15,bucksug16)

bucksugboth$year <- as.factor(year(bucksugboth$date))

cellN <- with(bucksugboth, table(treatment, year))
cellN
```

```
##          year
## treatment 2015 2016
##         C  208  142
##         H  208  154
```

```r
cellMean <- with(bucksugboth, tapply(BRIX, list(treatment, year), mean))
cellMean
```

```
##       2015     2016
## C 45.91827 56.78169
## H 55.27885 57.53896
```

```r
modBRIX <- lmer(BRIX ~ treatment * year + (1|plot), data = bucksugboth)

BRIX.grid <- ref.grid(modBRIX)
```

```
## Loading required namespace: lmerTest
```

```r
summary(BRIX.grid)
```

```
##  treatment year prediction       SE    df
##  C         2015   45.74795 1.617722 11.77
##  H         2015   55.44761 1.624299 11.90
##  C         2016   55.51917 1.726170 15.08
##  H         2016   57.98548 1.690454 13.99
##
## Degrees-of-freedom method: satterthwaite
```

```r
lsmeans(BRIX.grid, "treatment")
```

```
## NOTE: Results may be misleading due to involvement in interactions
```

```
##  treatment   lsmean       SE   df lower.CL upper.CL
##  C         50.63356 1.546545 9.81 47.17839 54.08873
##  H         56.71654 1.539492 9.62 53.26800 60.16509
##
## Results are averaged over the levels of: year
## Degrees-of-freedom method: satterthwaite
## Confidence level used: 0.95
```

```r
lsmeans(BRIX.grid, "year")
```

```
## NOTE: Results may be misleading due to involvement in interactions
```

```
##  year   lsmean       SE    df lower.CL upper.CL
##  2015 50.59778 1.146230 11.83 48.09646 53.09910
##  2016 56.75232 1.208025 14.53 54.17022 59.33443
##
## Results are averaged over the levels of: treatment
## Degrees-of-freedom method: satterthwaite
## Confidence level used: 0.95
```

```r
BRIX.treat <- lsmeans(BRIX.grid, "treatment")
```

```
## NOTE: Results may be misleading due to involvement in interactions
```

```r
pairs(BRIX.treat)
```

```
##  contrast  estimate       SE   df t.ratio p.value
##  C - H    -6.082983 2.182163 9.71  -2.788  0.0197
##
## Results are averaged over the levels of: year
```

```r
pairs.treat <- pairs(BRIX.treat)
test(pairs.treat, joint = T)
```

```
##  df1  df2     F p.value
##    1 9.71 7.771  0.0197
```

```r
BRIX.year <- lsmeans(BRIX.grid, "year")
```

```
## NOTE: Results may be misleading due to involvement in interactions
```

```r
pairs(BRIX.year)
```

```
##  contrast     estimate        SE     df t.ratio p.value
##  2015 - 2016 -6.154544 0.8857197 704.41  -6.949  <.0001
##
## Results are averaged over the levels of: treatment
```

```r
pairs.year <- pairs(BRIX.year)
test(pairs.year, joint = T)
```

```
##  df1    df2      F p.value
##    1 704.41 48.284  <.0001
```

```r
int.BRIX <- pairs(BRIX.grid, by = "year")
int.BRIX
```

```
## year = 2015:
##  contrast  estimate      SE    df t.ratio p.value
##  C - H    -9.699661 2.29246 11.83  -4.231  0.0012
##
## year = 2016:
##  contrast  estimate      SE    df t.ratio p.value
##  C - H    -2.466305 2.41605 14.53  -1.021  0.3240
```

```r
int.BRIXtable <- update(int.BRIX, by = NULL)
int.BRIXtable
```

```
##  contrast year  estimate      SE    df t.ratio p.value
##  C - H    2015 -9.699661 2.29246 11.83  -4.231  0.0012
##  C - H    2016 -2.466305 2.41605 14.53  -1.021  0.3240
```

```r
test(pairs(int.BRIXtable), joint = T)
```

```
##  df1    df2      F p.value
##    1 704.41 16.674  <.0001
```

```r
Anova(modBRIX, type = 3)
```

```
## Analysis of Deviance Table (Type III Wald chisquare tests)
##
## Response: BRIX
##                  Chisq Df Pr(>Chisq)
## (Intercept)    799.715  1  < 2.2e-16 ***
## treatment       17.902  1  2.325e-05 ***
## year            58.713  1  1.825e-14 ***
## treatment:year  16.674  1  4.440e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```