ModBalsMassBoth.R

Audrey McCombs

Sun Nov 27 20:45:14 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")

balssug15 <- read.csv("nectar analysis/data files/balssugar15.csv", header = T)
balssug16 <- read.csv("nectar analysis/data files/balssugar16.csv", header = T)
balssugboth <- rbind(balssug15,balssug16)

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

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

```
##          year
## treatment 2015 2016
##         C   30   80
##         H   56   71
```

```r
cellMean <- with(balssugboth, tapply(mass, list(treatment, year), mean))
cellMean
```

```
##         2015       2016
## C 0.09528345 0.04865045
## H 0.10940649 0.05275608
```

```r
modmass <- lmer(mass ~ treatment * year + (1|plot/plant), data = balssugboth)

mass.grid <- ref.grid(modmass)
```

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

```r
summary(mass.grid)
```

```
##  treatment year prediction          SE    df
##  C         2015 0.09847256 0.013422314 49.23
##  H         2015 0.11243507 0.010582621 19.55
##  C         2016 0.04738959 0.009105025 15.97
##  H         2016 0.05223706 0.009519857 14.17
##
## Degrees-of-freedom method: satterthwaite
```

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

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

```
##  treatment     lsmean          SE    df   lower.CL   upper.CL
##  C         0.07293107 0.009012363 14.76 0.05369497 0.09216718
##  H         0.08233607 0.008366112  8.30 0.06316496 0.10150718
##
## Results are averaged over the levels of: year
## Degrees-of-freedom method: satterthwaite
## Confidence level used: 0.95
```

```
lsmeans(mass.grid, "year")
```

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

```
##  year     lsmean          SE    df   lower.CL   upper.CL
##  2015 0.10545382 0.008546203 33.66 0.08807934 0.12282829
##  2016 0.04981332 0.006586524 15.03 0.03577693 0.06384972
##
## Results are averaged over the levels of: treatment
## Degrees-of-freedom method: satterthwaite
## Confidence level used: 0.95
```

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

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

```
pairs(mass.treat)
```

```
##  contrast     estimate         SE   df t.ratio p.value
##  C - H    -0.009404992 0.01229693 11.1  -0.765  0.4603
##
## Results are averaged over the levels of: year
```

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

```
##  df1  df2     F p.value
##    1 11.1 0.585  0.4603
```

```
mass.year <- lsmeans(mass.grid, "year")
```

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

```
pairs(mass.year)
```

```
##  contrast      estimate         SE     df t.ratio p.value
##  2015 - 2016 0.05564049 0.00903467 154.43   6.159  <.0001
##
## Results are averaged over the levels of: treatment
```

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

```
##  df1    df2      F p.value
##    1 154.43 37.928  <.0001
```

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

```
## year = 2015:
##  contrast     estimate         SE    df t.ratio p.value
##  C - H    -0.013962511 0.01709241 33.66  -0.817  0.4197
##
## year = 2016:
##  contrast     estimate         SE    df t.ratio p.value
##  C - H    -0.004847473 0.01317305 15.03  -0.368  0.7180
```

```
int.masstable <- update(int.mass, by = NULL)
int.masstable
```

```
##  contrast year     estimate         SE    df t.ratio p.value
##  C - H    2015 -0.013962511 0.01709241 33.66  -0.817  0.4197
##  C - H    2016 -0.004847473 0.01317305 15.03  -0.368  0.7180
```

```
test(pairs(int.masstable), joint = T)
```

```
##  df1    df2     F p.value
##    1 154.43 0.254  0.6147
```

```
Anova(modmass, type = 3)
```

```
## Analysis of Deviance Table (Type III Wald chisquare tests)
##
## Response: mass
##                  Chisq Df Pr(>Chisq)
## (Intercept)    53.8240  1  2.193e-13 ***
## treatment       0.6673  1  0.4139948
## year           12.9676  1  0.0003169 ***
## treatment:year  0.2545  1  0.6139467
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```