models.R

Audrey McCombs

Sun Nov 27 20:42:52 2016

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

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

```r
library(nlme)
```

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

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

```r
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
```

```r
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
```

```r
library(multcompView)
```

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

```r
library(car)
```

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

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

balsvol15 <- read.csv("nectar analysis/Bals 15 vol no outliers/balsvol15sub.csv", header = T)
balsvol16 <- read.csv("nectar analysis/data files/balsvol16.csv", header = T)
balsvolboth <- rbind(balsvol15,balsvol16)

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

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

```
##          year
## treatment 2015 2016
##         C   30   85
##         H   60   83
```

```
cellMean <- with(balsvolboth, tapply(volume, list(treatment, year), mean))
cellMean
```

```
##        2015      2016
## C 0.5339394 0.1659893
## H 0.4309091 0.1526835
```

```
modvol <- lmer(volume ~ treatment * year + (1|plot/plant), data = balsvolboth)

volume.grid <- ref.grid(modvol)
```

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

```
summary(volume.grid)
```

```
##   treatment year prediction       SE    df
## C             2015  0.5335484 0.05159620 54.53
## H             2015  0.4367792 0.03893652 24.20
## C             2016  0.1644973 0.03310838 20.23
## H             2016  0.1538873 0.03403117 16.82
##
## Degrees-of-freedom method: satterthwaite
```

```
lsmeans(volume.grid, "treatment")
```

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

```
##   treatment    lsmean         SE    df  lower.CL  upper.CL
## C             0.3490229 0.03291970 18.25 0.2799277 0.4181180
## H             0.2953332 0.02902944  8.67 0.2292752 0.3613913
##
## Results are averaged over the levels of: year
## Degrees-of-freedom method: satterthwaite
## Confidence level used: 0.95
```

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

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

```
##  year    lsmean         SE    df lower.CL upper.CL
##  2015 0.4851638 0.03231958 40.82 0.4198843 0.5504433
##  2016 0.1591923 0.02373966 18.43 0.1093996 0.2089850
##
## Results are averaged over the levels of: treatment
## Degrees-of-freedom method: satterthwaite
## Confidence level used: 0.95
```

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

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

```r
pairs(volume.treat)
```

```
##  contrast   estimate         SE   df t.ratio p.value
##  C - H    0.05368962 0.04389094 12.8   1.223  0.2433
##
## Results are averaged over the levels of: year
```

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

```
##  df1  df2     F p.value
##    1 12.8 1.496  0.2433
```

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

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

```r
pairs(volume.year)
```

```
##  contrast    estimate         SE    df t.ratio p.value
##  2015 - 2016 0.3259715 0.03591432 115.9   9.076  <.0001
##
## Results are averaged over the levels of: treatment
```

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

```
##  df1   df2     F p.value
##    1 115.9 82.38  <.0001
```

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

```
## year = 2015:
##  contrast   estimate         SE    df t.ratio p.value
##  C - H    0.09676919 0.06463916 40.82   1.497  0.1421
##
## year = 2016:
##  contrast   estimate         SE    df t.ratio p.value
##  C - H    0.01061005 0.04747931 18.43   0.223  0.8256
```

```
int.voltable <- update(int.vol, by = NULL)
int.voltable
```

```
##  contrast year   estimate         SE    df t.ratio p.value
##  C - H    2015 0.09676919 0.06463916 40.82   1.497  0.1421
##  C - H    2016 0.01061005 0.04747931 18.43   0.223  0.8256
```

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

```
##  df1   df2     F p.value
##    1 115.9 1.439  0.2328
```

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

```
## Analysis of Deviance Table (Type III Wald chisquare tests)
##
## Response: volume
##                  Chisq Df Pr(>Chisq)
## (Intercept)    106.9331  1  < 2.2e-16 ***
## treatment        2.2412  1     0.1344
## year            42.8050  1  6.048e-11 ***
## treatment:year   1.4388  1     0.2303
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```