ModBalsVolBoth.R

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```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/data files/balsvol15.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   31   85
##         H   61   83
```

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

```
##       2015      2016
## C 0.6404692 0.1659893
## H 0.4891207 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  0.6296110 0.07498411 85.06
## H           2015  0.4925888 0.05634582 28.72
## C           2016  0.1627629 0.04811851 24.38
## H           2016  0.1535502 0.04947747 19.55
##
## 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           0.3961870 0.04727535 20.68 0.2977796 0.4945943
## H           0.3230695 0.04122045  9.19 0.2301114 0.4160277
##
## 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 0.5610999 0.04689741 54.57 0.46709877 0.6551010
##   2016 0.1581566 0.03450874 21.71 0.08653357 0.2297796
##
## 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    0.07311745 0.06272228 14.02   1.166  0.2632
##
## 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 14.02 1.359  0.2632
```

```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 0.4029433 0.05335124 255.84   7.553  <.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
##   1 255.84 57.043  <.0001
```

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

```
## year = 2015:
##  contrast    estimate         SE    df t.ratio p.value
##  C - H     0.137022160 0.09379482 54.57   1.461  0.1498
##
## year = 2016:
##  contrast    estimate         SE    df t.ratio p.value
##  C - H     0.009212747 0.06901747 21.71   0.133  0.8950
```

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

```
##  contrast year    estimate         SE    df t.ratio p.value
##  C - H    2015 0.137022160 0.09379482 54.57   1.461  0.1498
##  C - H    2016 0.009212747 0.06901747 21.71   0.133  0.8950
```

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

```
##  df1    df2     F p.value
##    1 255.84 1.435  0.2321
```

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

```
## Analysis of Deviance Table (Type III Wald chisquare tests)
##
## Response: volume
##                 Chisq Df Pr(>Chisq)
## (Intercept)   70.5028  1  < 2.2e-16 ***
## treatment      2.1341  1     0.1441
## year          31.4218  1  2.076e-08 ***
## treatment:year 1.4348  1     0.2310
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```