Staygreen Trait Efficacy

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Year of data collection: 2012

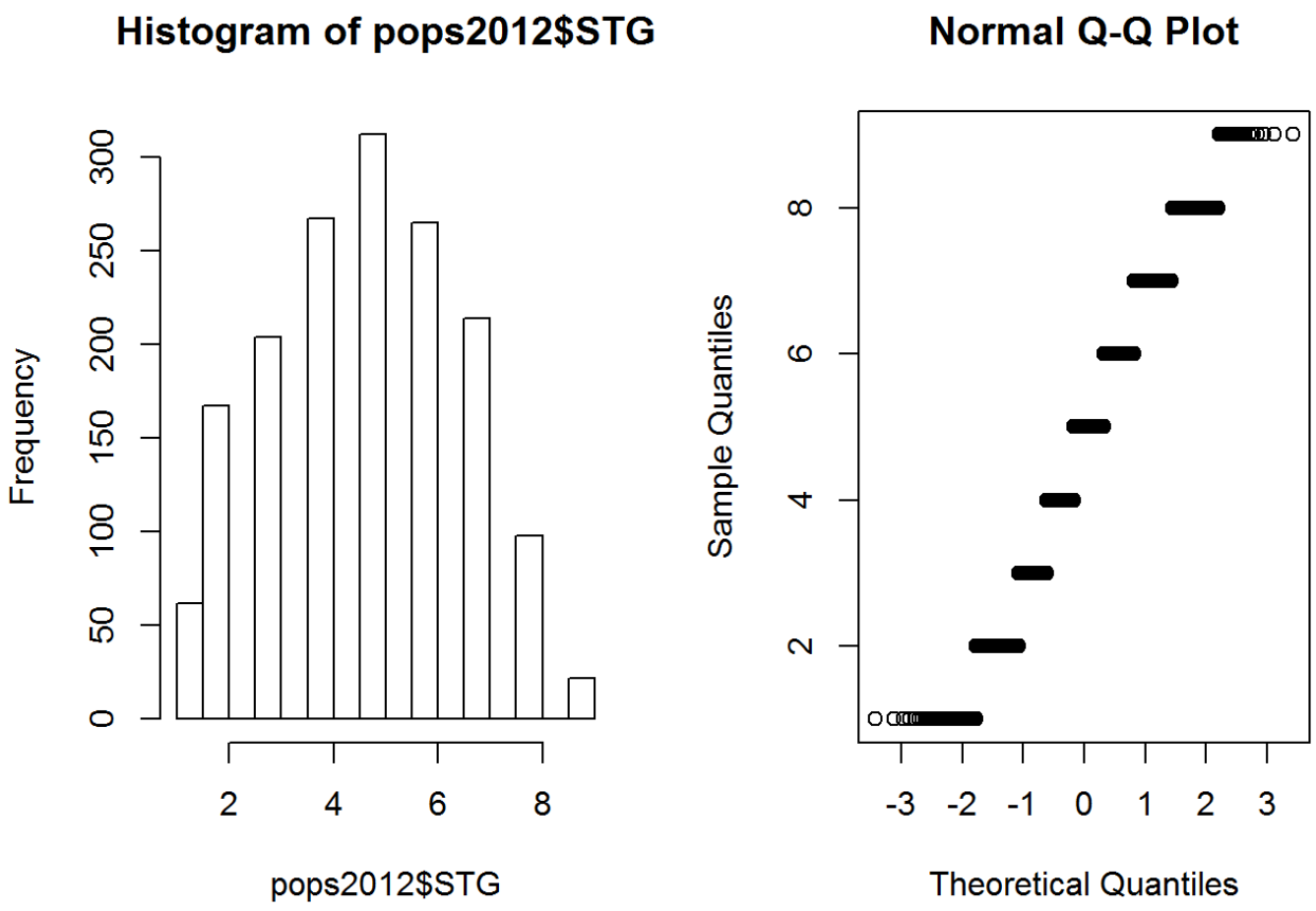
Moisture stress levels: Mod-High

Locations: Three

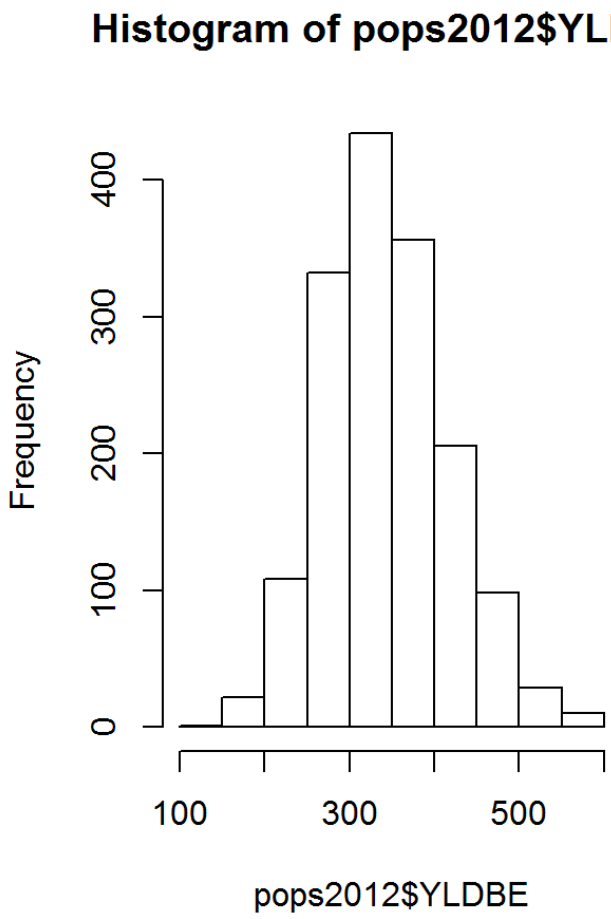
- *Hale Center, TX*
- *Levelland, TX*
- *Lamesa, TX*

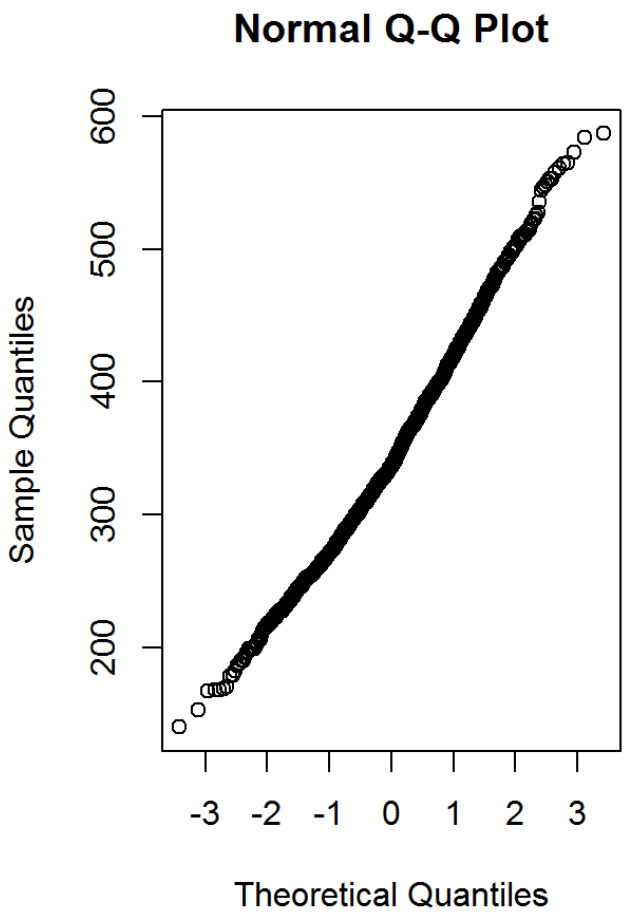
Histograms & Q-Q plots for YLDBE & STG

```
par(mfrow=c(1,2));hist(pops2012$STG); qqnorm(pops2012$STG)
```



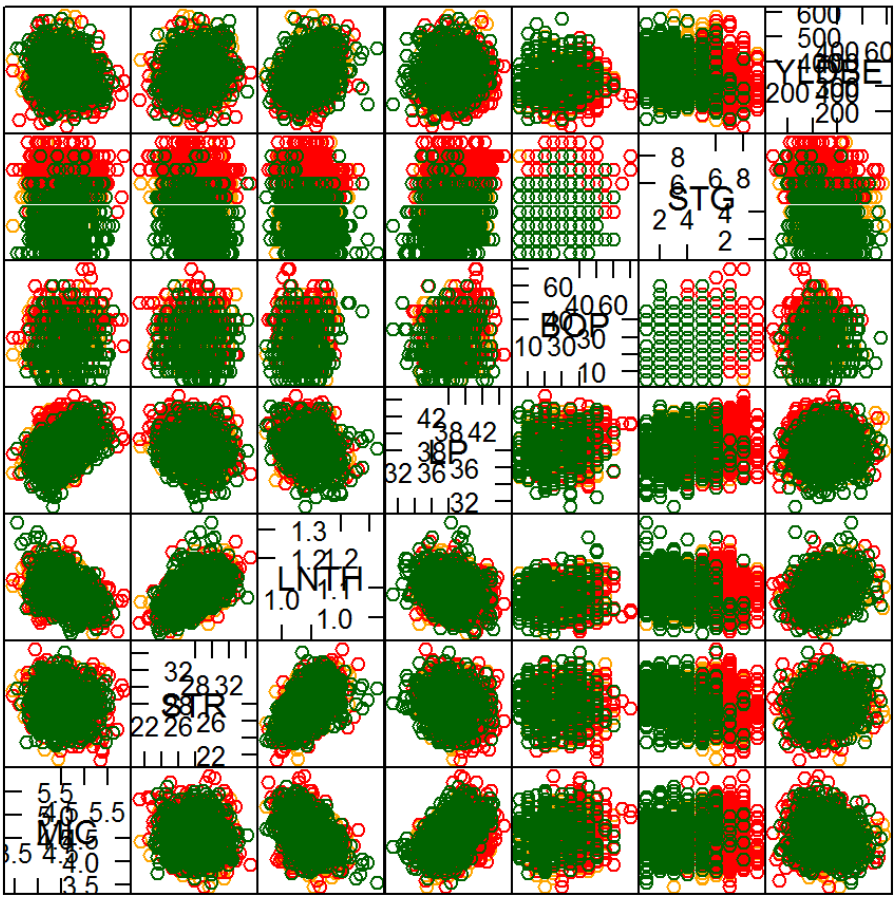
```
par(mfrow=c(1,2));hist(pops2012$YLDBE); qqnorm(pops2012$YLDBE)
```





Feature plot comparing all traits to each other

```
featurePlot(x=pops2012[c("MIC","STR","LNTH","LP","BOP","STG","YLDBE")], y=pops2012$Staygr
eenGroup, plot="pairs", auto.key=FALSE, col=c("orange","red","dark green"))
```



Scatter Plot Matrix

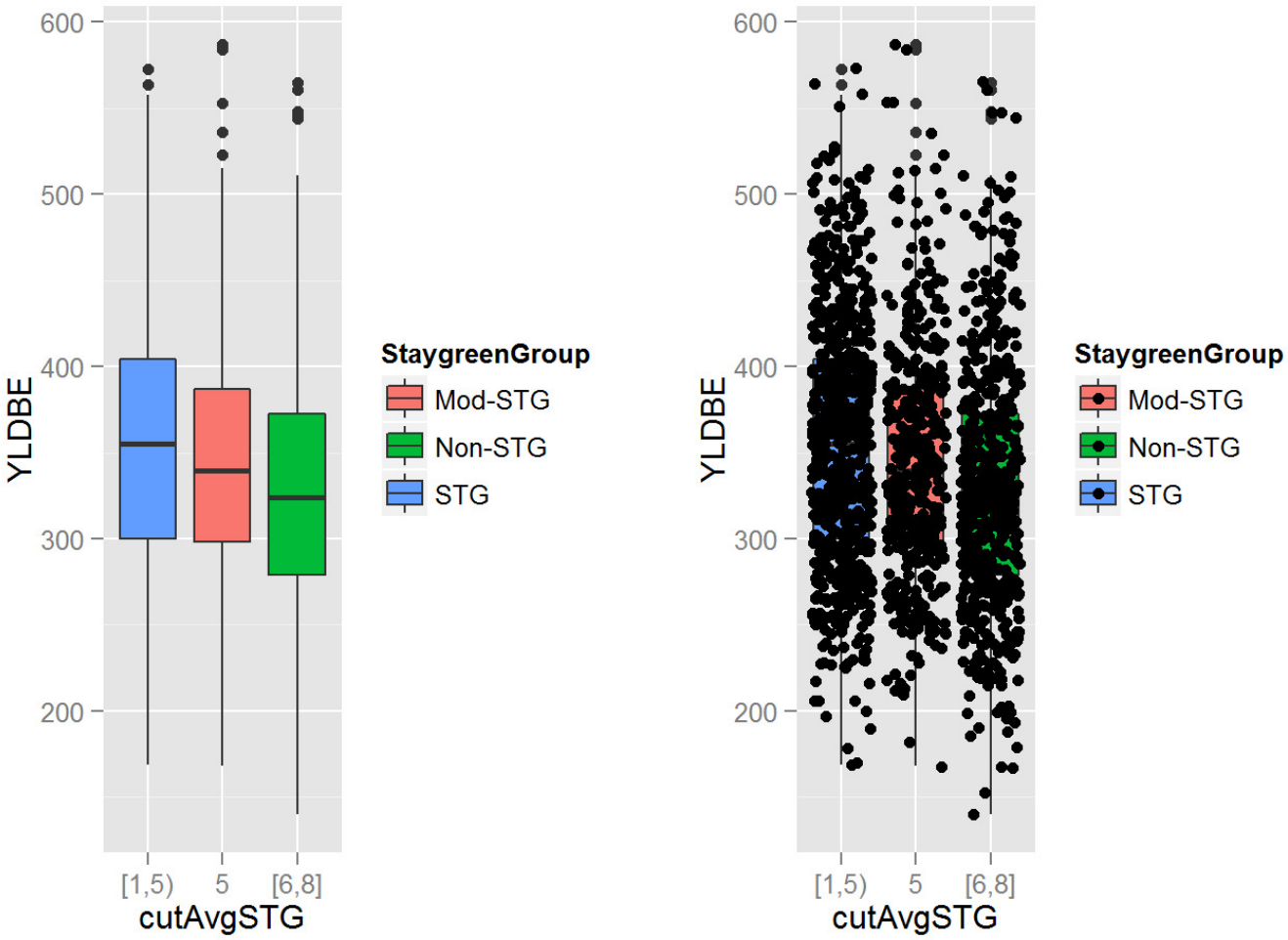
Cut Staygreen phenotype using the average Staygreen phenotype across all reps. Cut is made by dividing AvgSTG into three quantile groups

```
cutAvgSTG<- cut2(pops2012$AvgSTG,g=3)
table(cutAvgSTG)
```

```
## cutAvgSTG
## [1,5)     5 [6,8]
##   675   405   531
```

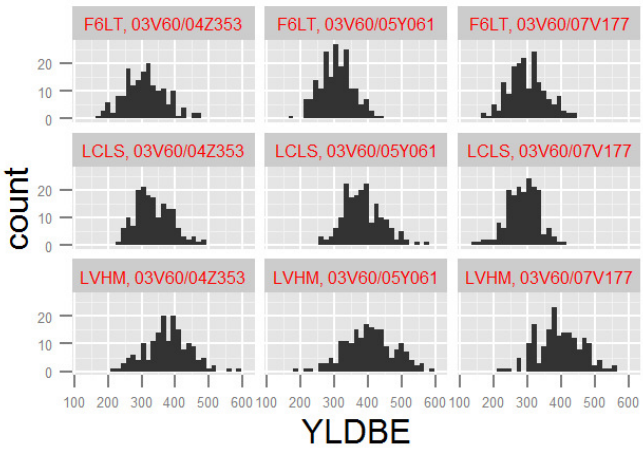
Staygreen groups compared for YLDBE using box plots

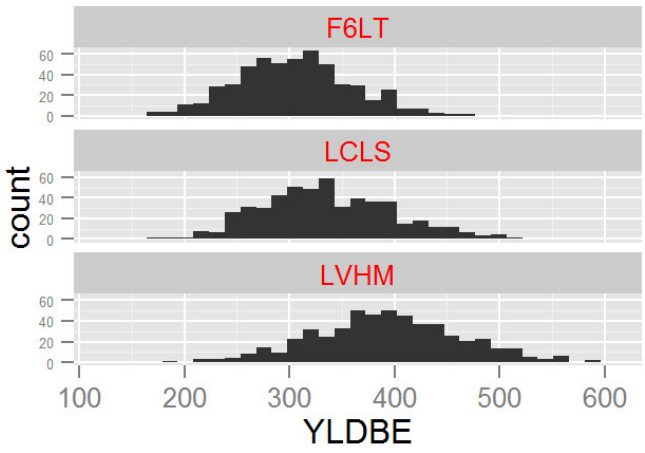
```
p1<- qplot(cutAvgSTG, YLDBE, data=pops2012, fill=StaygreenGroup, geom=c("boxplot"))
#box plot with jitter
p2<- qplot(cutAvgSTG, YLDBE, data=pops2012, fill=StaygreenGroup, geom=c("boxplot","jitte
r"))
grid.arrange(p1,p2,ncol=2)
```

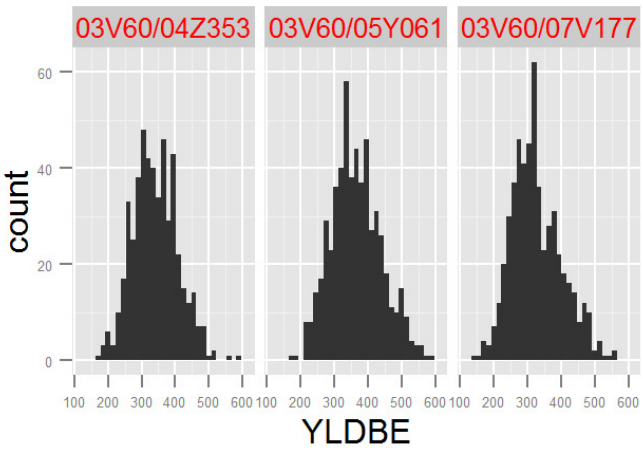


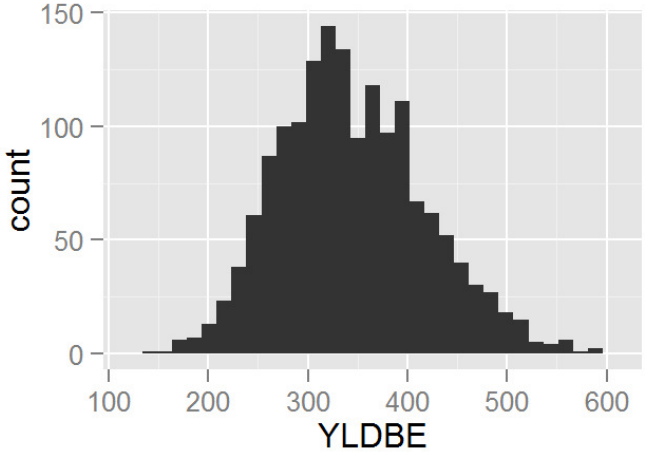
Distribution using bar plots

```
p3 <- ggplot(data = pops2012, aes(x=YLDBE)) + geom_bar() + facet_wrap( ~ Field + Origin)
+ theme(axis.text=element_text(size = 5), strip.text.x = element_text(colour = "red", siz
e = 6))
p4 <- ggplot(data = pops2012, aes(x=YLDBE)) + geom_bar() + facet_wrap( ~ Field, nrow=3) +
theme(axis.text.y=element_text(size = 5), strip.text.x = element_text(colour = "red"))
p5<-  ggplot(data = pops2012, aes(x=YLDBE)) + geom_bar() + facet_wrap(~Origin, as.table=T
RUE, ncol=3) + theme(strip.text.x = element_text(colour = "red"),axis.text=element_text(s
ize = 5),axis.text.x=element_text(size = 5))
p6 <- ggplot(data = pops2012, aes(x=YLDBE)) + geom_bar()
grid.arrange(p3,p4,p5,p6,ncol=2, nrow=2)
```



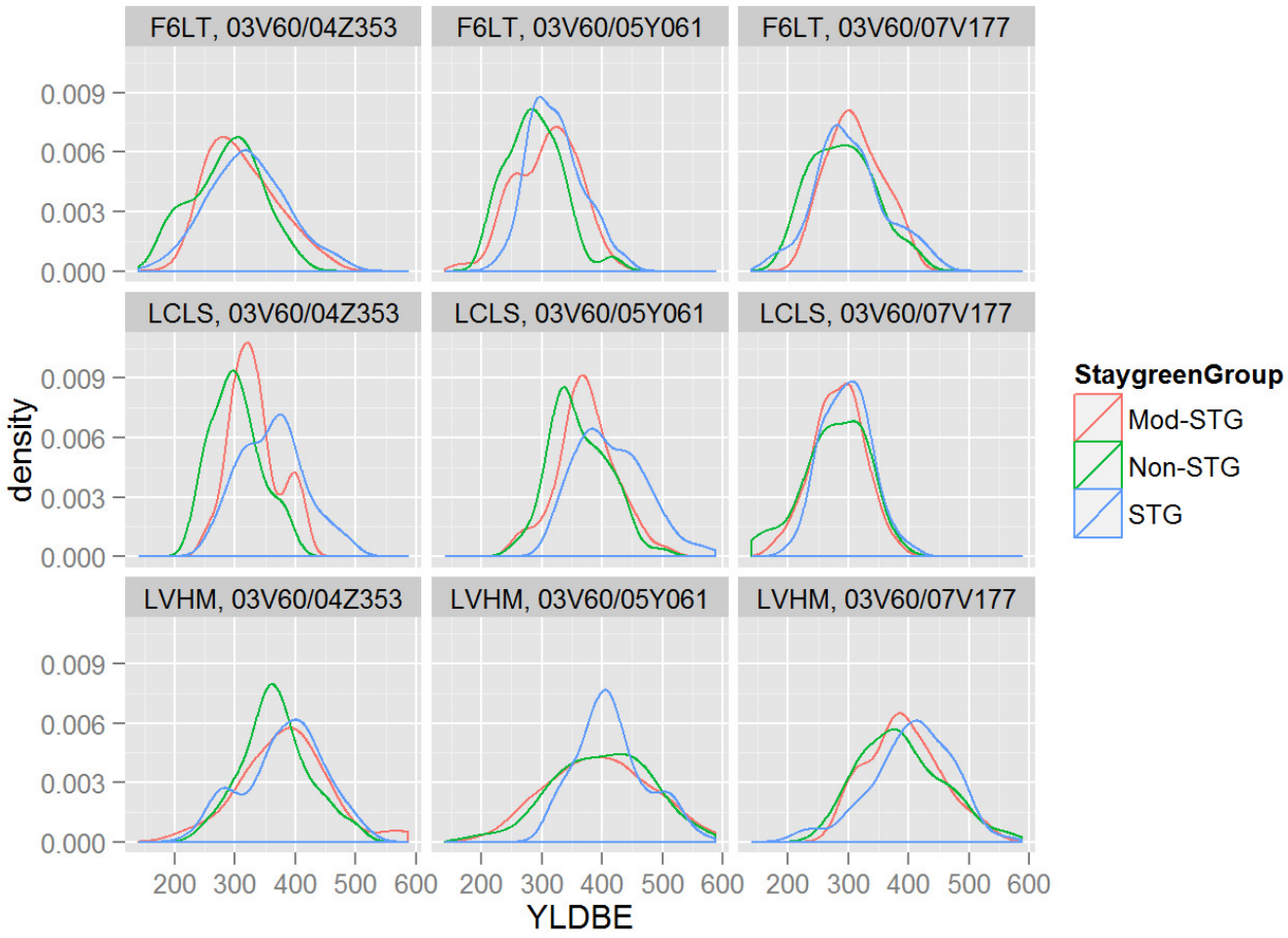






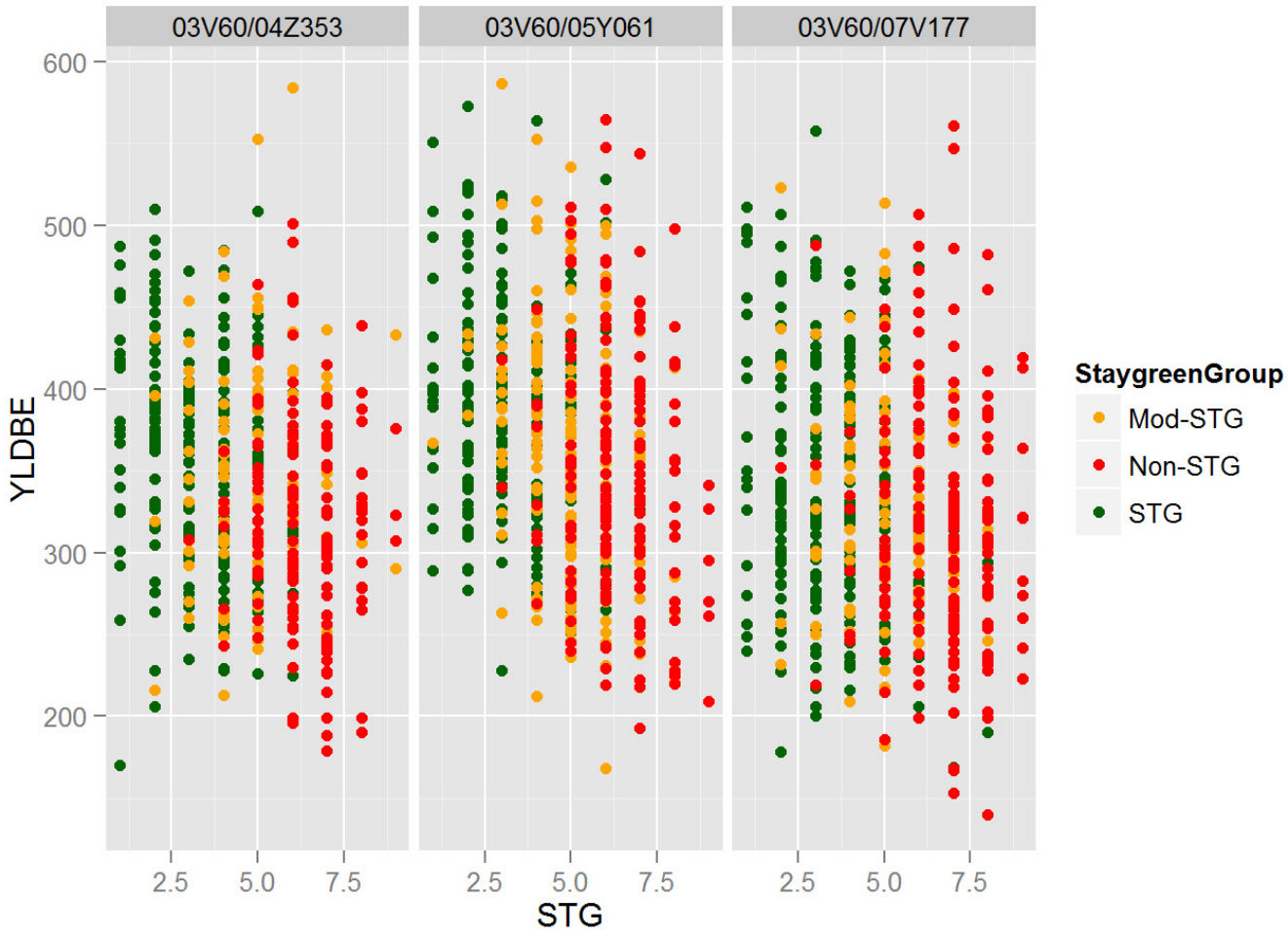
Distribution using density plots

```
#density plot with color
ggplot(data = pops2012, aes(x=YLDBE)) + geom_density(aes(colour=StaygreenGroup)) + face
t_wrap( ~ Field + Origin)
```

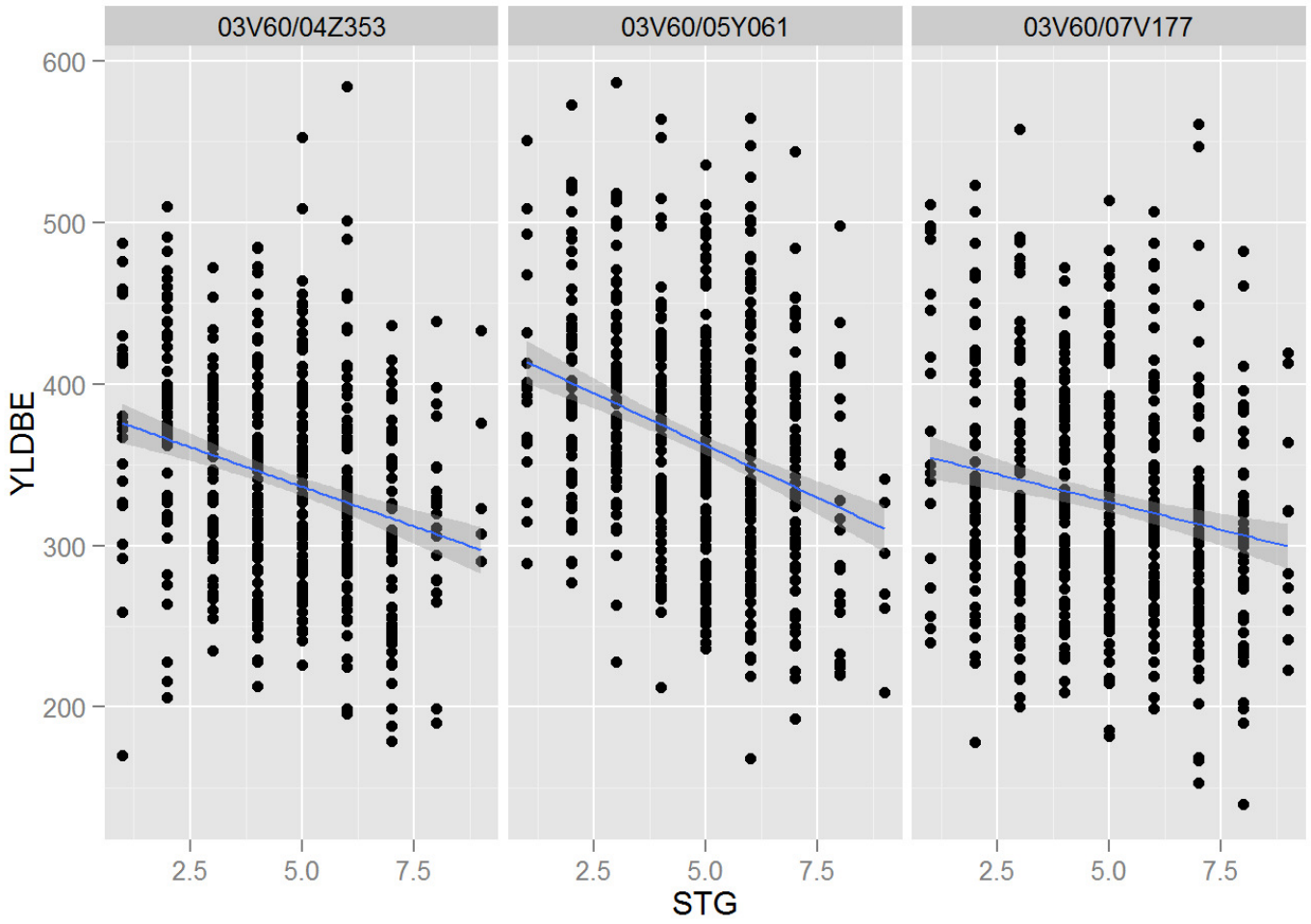


Scatterplots comparing Staygreen phenotype to YLDBE

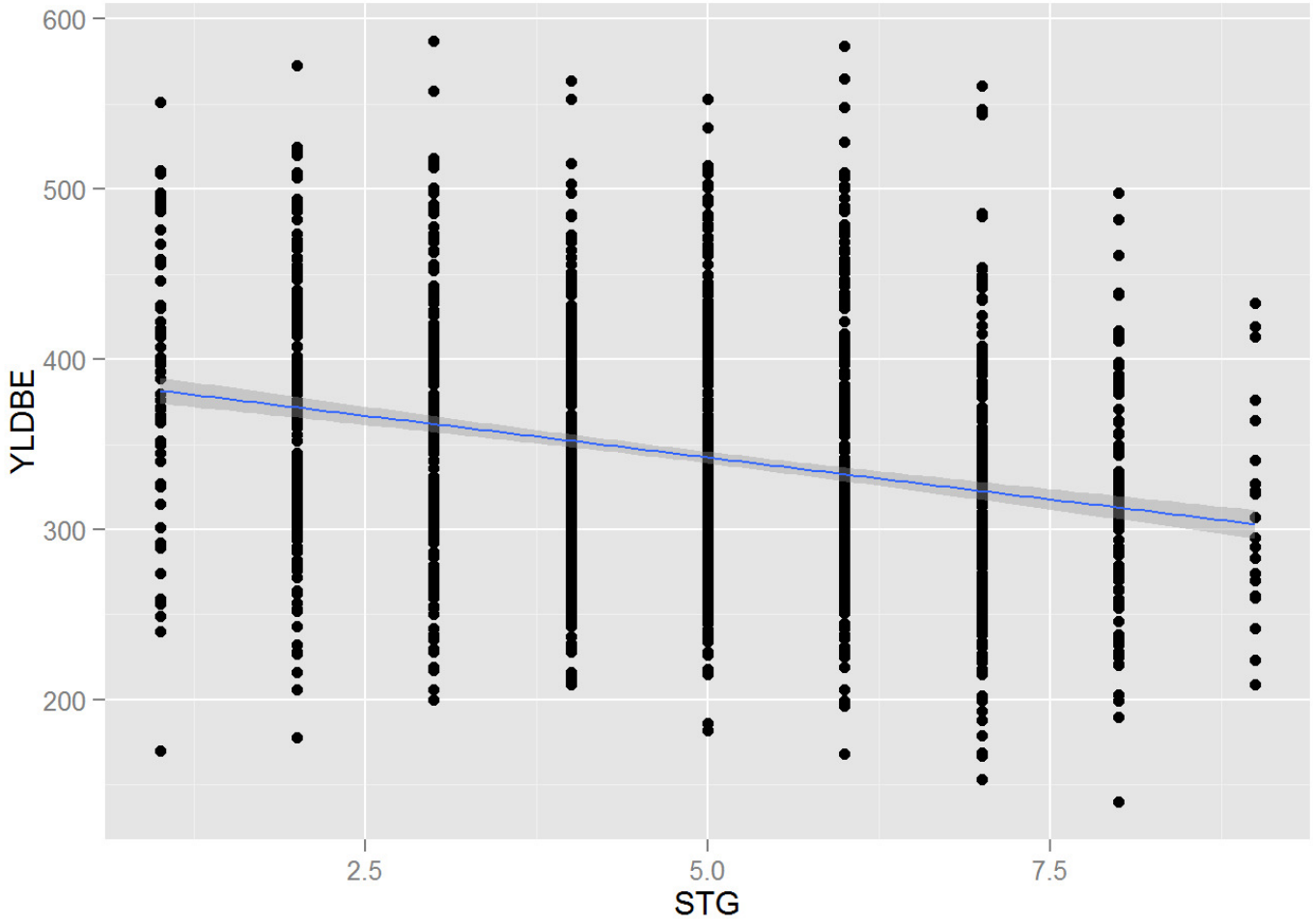
```
#scatterplot without fitted line but colored by decision
scatter3<- qplot(STG,YLDBE, data=pops2012, color=StaygreenGroup)
scatter3 + geom_point() + facet_wrap(~ Origin, as.table=FALSE) + scale_color_manual(value
s = c("Mod-STG"="orange","Non-STG"="red", "STG"="dark green"))
```




```
#scatterplot with fitted line but no color
scatter2<- qplot(STG,YLDBE, data=pops2012)
scatter2 + geom_point() +  geom_smooth(method=lm) + facet_wrap(~ Origin, as.table=FALSE)
```




```
#scatterplot with fitted line BUT no facet groups
scatter5<- qplot(STG,YLDBE, data=pops2012)
scatter5 + geom_point() +  geom_smooth(method=lm)
```



Create data subsets for each Origin

Fraction of variation in YLDBE explained by the least-square regression of YLDBE on STG

```
#Regression of YLDBE over STG across Origins
lml<- lm(YLDBE ~ STG,data=pops2012)
summary(lml)
```

```
##
## Call:
## lm(formula = YLDBE ~ STG, data = pops2012)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -211.745  -50.614   -4.853   44.049  251.386
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 391.5706     4.7819   81.89   <2e-16 ***
## STG          -9.8260     0.9292  -10.57   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 70.72 on 1594 degrees of freedom
##   (15 observations deleted due to missingness)
## Multiple R-squared:  0.06556,    Adjusted R-squared:  0.06497
## F-statistic: 111.8 on 1 and 1594 DF,  p-value: < 2.2e-16
```

```
#Regression of YLDBE over STG for 03V60/07V177
lmlC2304<- lm(YLDBE ~ STG,data=C2304)
summary(lmlC2304)
```

```
##
## Call:
## lm(formula = YLDBE ~ STG, data = C2304)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -169.661  -50.661   -9.035   49.215  247.716
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  361.412      8.290  43.598  < 2e-16 ***
## STG           -6.875      1.556  -4.417 1.21e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 72.58 on 535 degrees of freedom
##   (3 observations deleted due to missingness)
## Multiple R-squared:  0.03519,    Adjusted R-squared:  0.03338
## F-statistic: 19.51 on 1 and 535 DF,  p-value: 1.21e-05
```

```
#Regression of YLDBE over STG for 03V60/04Z353
lmlC2305<- lm(YLDBE ~ STG,data=C2305)
summary(lmlC2305)
```

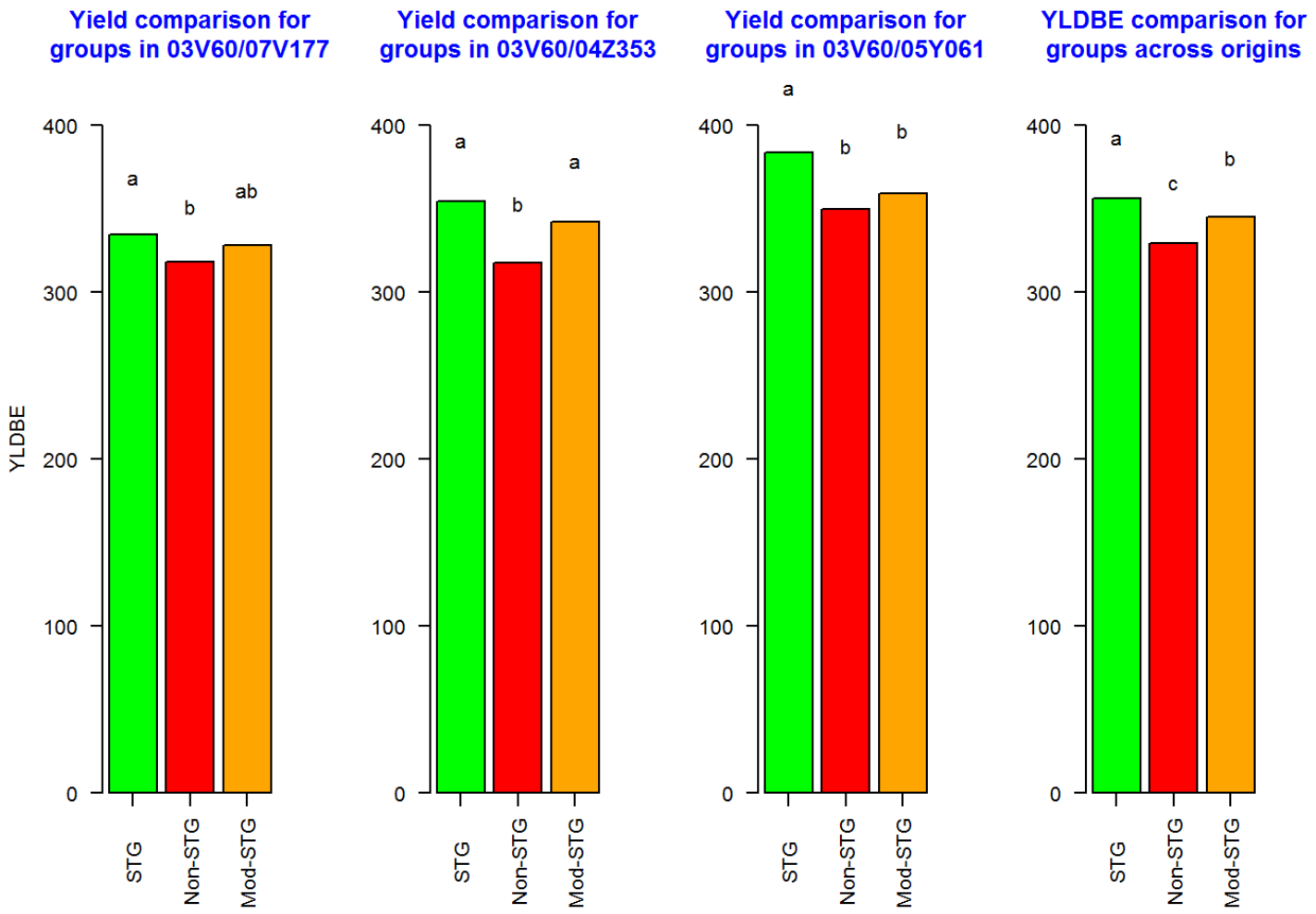
```
##
## Call:
## lm(formula = YLDBE ~ STG, data = C2305)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -205.773  -42.647   -0.064   41.700  257.256
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  385.579      7.661  50.330  < 2e-16 ***
## STG           -9.806      1.543  -6.356 4.68e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 63.85 on 498 degrees of freedom
##   (4 observations deleted due to missingness)
## Multiple R-squared:  0.07504,    Adjusted R-squared:  0.07318
## F-statistic:  40.4 on 1 and 498 DF,  p-value: 4.681e-10
```

```
#Regression of YLDBE over STG for 03V60/05Y061
lmlC2306<- lm(YLDBE ~ STG,data=C2306)
summary(lmlC2306)
```

```
##
## Call:
## lm(formula = YLDBE ~ STG, data = C2306)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -181.143  -48.143   -6.063   41.977  215.857
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  426.665      8.254  51.692  < 2e-16 ***
## STG          -12.920      1.609  -8.029 5.85e-15 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 69.74 on 557 degrees of freedom
##   (8 observations deleted due to missingness)
## Multiple R-squared:  0.1037, Adjusted R-squared:  0.1021
## F-statistic: 64.47 on 1 and 557 DF,  p-value: 5.849e-15
```

Analysis of Variance for YLDBE

View ANOVA results using bar plots



Analysis of Variance for other traits

View ANOVA results for other traits using bar plots