

TOC-Assimilation Statistics

```
library(tidyverse)
```

```
## -- Attaching packages ----- tidyverse 1.3.1 -  
-
```

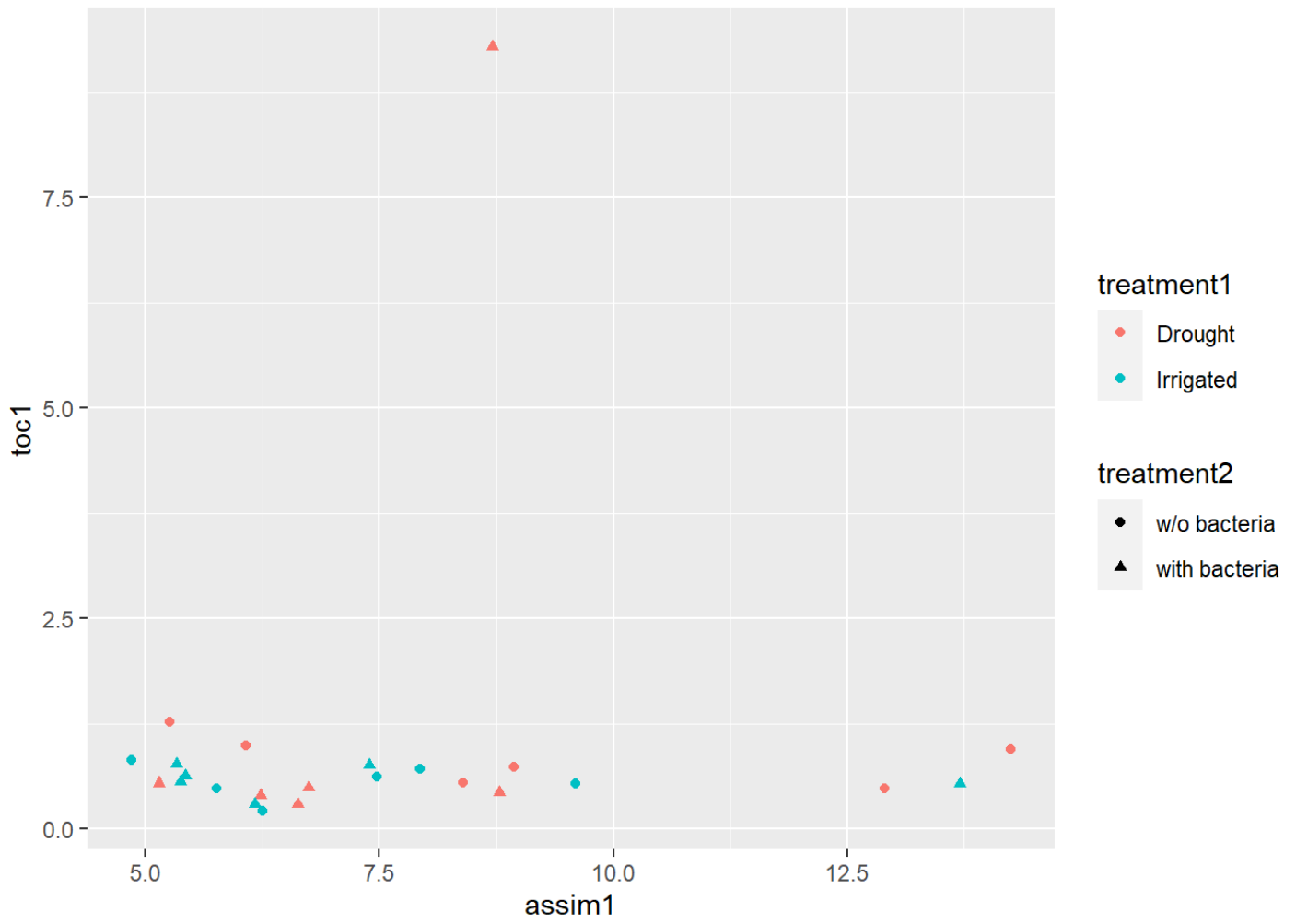
```
## v ggplot2 3.3.5      v purrr  0.3.4  
## v tibble  3.1.5      v dplyr  1.0.7  
## v tidyr   1.1.4      v stringr 1.4.0  
## v readr   2.0.2      v forcats 0.5.1
```

```
## -- Conflicts ----- tidyverse_conflicts() -  
-  
## x dplyr::filter() masks stats::filter()  
## x dplyr::lag()    masks stats::lag()
```

```
library(readxl)  
library(emmeans)  
setwd("C:/Dropbox (Weizmann Institute)/Labs/Klein/Yaara/Paper/")  
dat <- read_xlsx("For TOC covariate.xlsx", sheet="combined")  
dat$treatment1 <- as.factor(dat$treatment1)  
dat$treatment2 <- as.factor(dat$treatment2)
```

Pre Drought

```
ggplot(data=dat, aes(x=assim1, y=tocl)) +  
  geom_point(aes(color=treatment1, shape=treatment2))
```

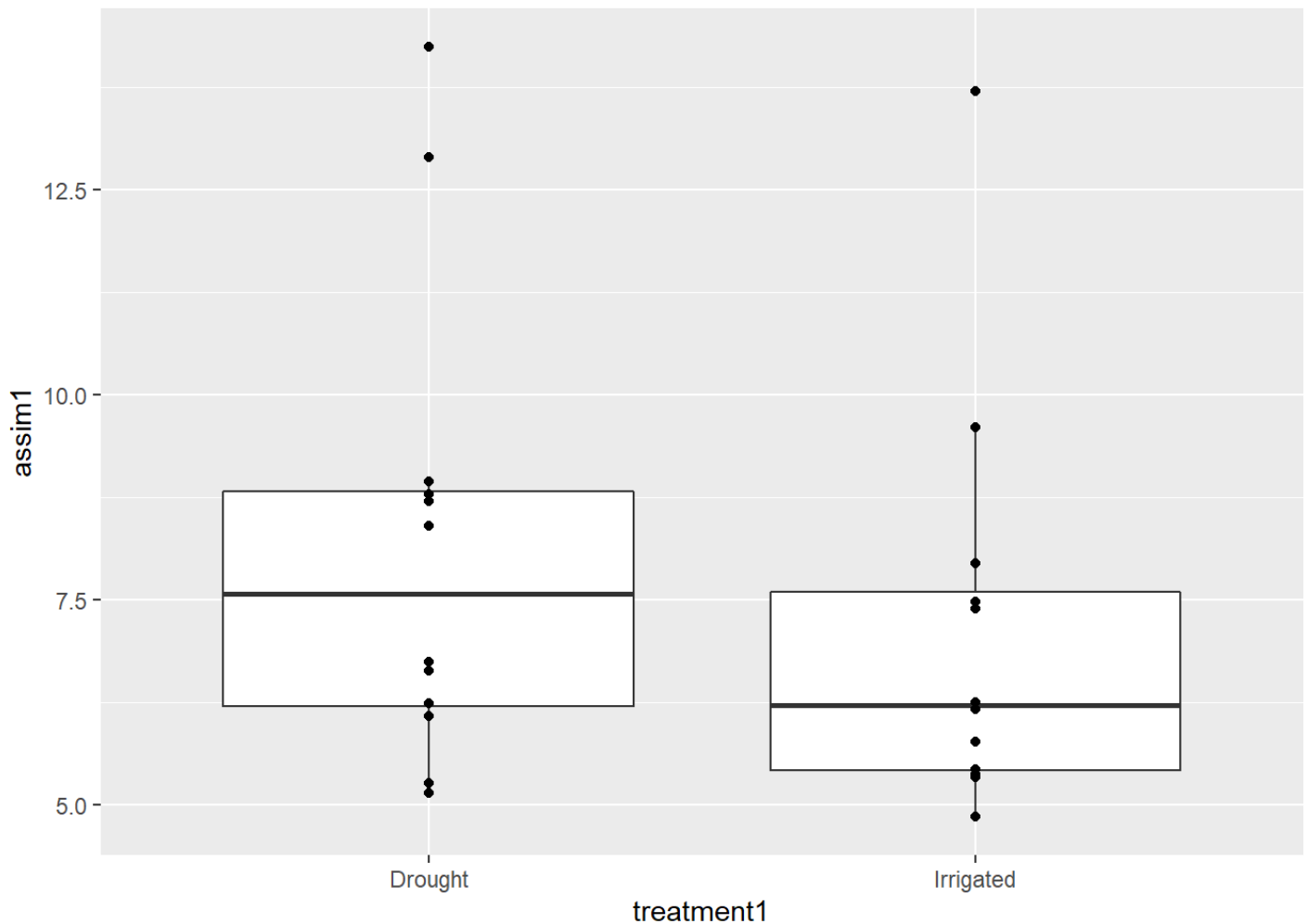


```
m1 <- lm(toc1 ~ treatment1 * treatment2 + assim1, data=dat)
summary(m1)
```

```
##
## Call:
## lm(formula = toc1 ~ treatment1 * treatment2 + assim1, data = dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.6167 -0.5897 -0.1348  0.1618  7.2506
##
## Coefficients:
##
##              Estimate Std. Error t value
## (Intercept)      0.08605     1.62844   0.053
## treatment1Irrigated -0.08134     1.12989  -0.072
## treatment2with bacteria  1.25943     1.12692   1.118
## assim1           0.08011     0.15497   0.517
## treatment1Irrigated:treatment2with bacteria -1.24782     1.56389  -0.798
##
##              Pr(>|t|)
## (Intercept)      0.958
## treatment1Irrigated  0.943
## treatment2with bacteria  0.278
## assim1           0.611
## treatment1Irrigated:treatment2with bacteria  0.435
##
## Residual standard error: 1.855 on 19 degrees of freedom
## Multiple R-squared:  0.111, Adjusted R-squared:  -0.07618
## F-statistic: 0.593 on 4 and 19 DF,  p-value: 0.6719
```

Assimilation by irrigation

```
ggplot(data=dat, aes(x=treatment1, y=assim1)) +
  geom_boxplot() +
  geom_point()
```

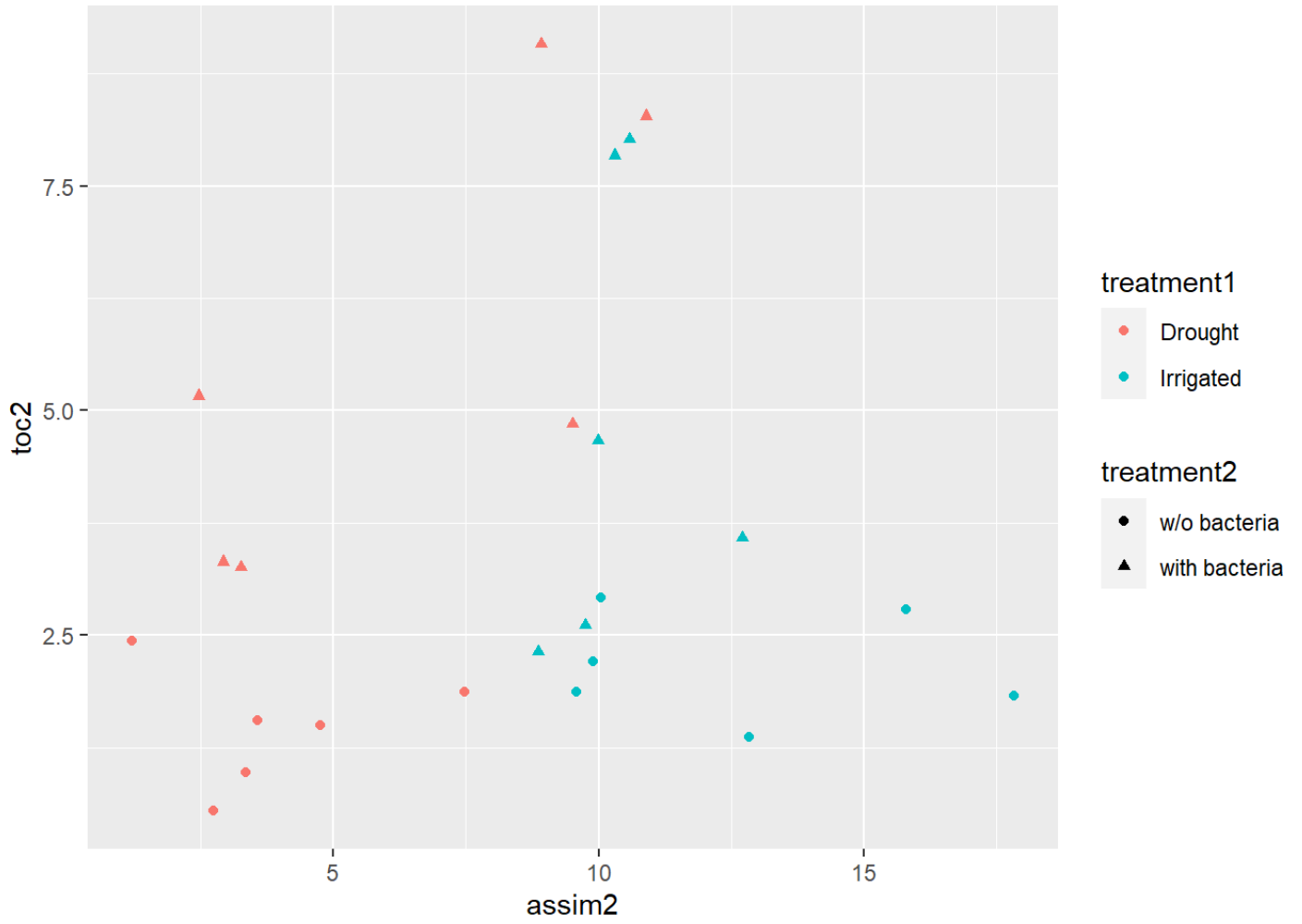


```
t.test(assim1 ~ treatment1, data=dat)
```

```
##
## Welch Two Sample t-test
##
## data: assim1 by treatment1
## t = 0.97249, df = 21.562, p-value = 0.3416
## alternative hypothesis: true difference in means between group Drought and group Irrigated is not equal to 0
## 95 percent confidence interval:
## -1.210864  3.344429
## sample estimates:
## mean in group Drought mean in group Irrigated
##           8.170932           7.104149
```

Drought peirod

```
ggplot(data=dat, aes(x=assim2, y=toc2)) +
  geom_point(aes(color=treatment1, shape=treatment2))
```

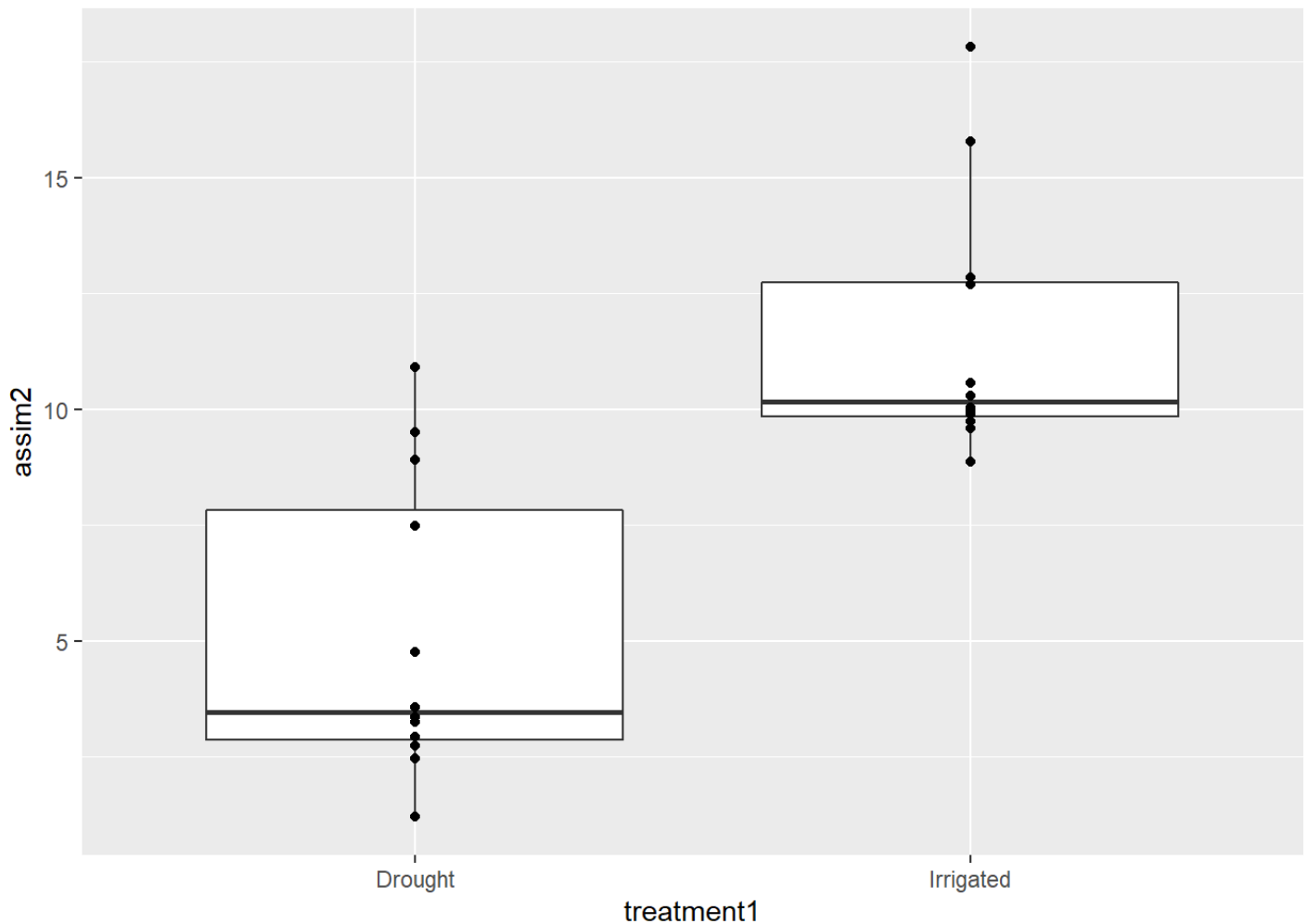


```
m2 <- lm(toc2 ~ treatment1 * treatment2 + assim2, data=dat)
summary(m2)
```

```
##
## Call:
## lm(formula = toc2 ~ treatment1 * treatment2 + assim2, data = dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.1821 -1.5127 -0.1372  0.8410  3.1351
##
## Coefficients:
##
##              Estimate Std. Error t value
## (Intercept)      0.6074     0.8877   0.684
## treatment1Irrigated -1.3119     1.5711  -0.835
## treatment2with bacteria  3.6161     1.0665   3.391
## assim2            0.2264     0.1364   1.659
## treatment1Irrigated:treatment2with bacteria -0.4183     1.5722  -0.266
##
##              Pr(>|t|)
## (Intercept)      0.50205
## treatment1Irrigated  0.41409
## treatment2with bacteria  0.00307 **
## assim2            0.11344
## treatment1Irrigated:treatment2with bacteria  0.79308
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.752 on 19 degrees of freedom
## Multiple R-squared:  0.5852, Adjusted R-squared:  0.4979
## F-statistic: 6.702 on 4 and 19 DF,  p-value: 0.001535
```

Assimilation by irrigation

```
ggplot(data=dat, aes(x=treatment1, y=assim2)) +
  geom_boxplot() +
  geom_point()
```

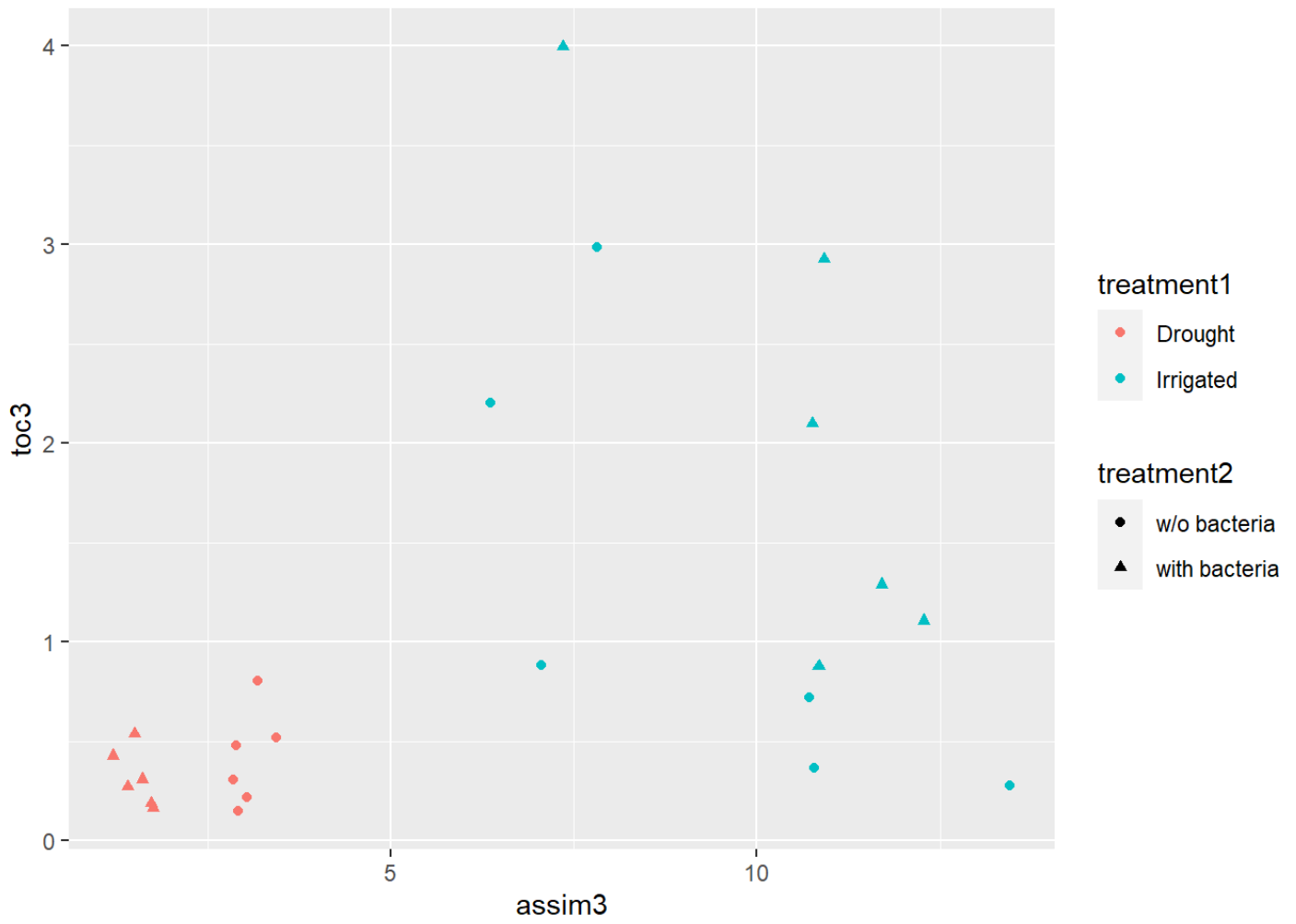


```
t.test(assim2 ~ treatment1, data=dat)
```

```
##
## Welch Two Sample t-test
##
## data:  assim2 by treatment1
## t = -5.2272, df = 21.515, p-value = 3.259e-05
## alternative hypothesis: true difference in means between group Drought and group Irrigated is not equal to 0
## 95 percent confidence interval:
##  -8.972579 -3.870485
## sample estimates:
##  mean in group Drought mean in group Irrigated
##           5.090818           11.512350
```

Re-Irrigated

```
ggplot(data=dat, aes(x=assim3, y=toc3)) +
  geom_point(aes(color=treatment1, shape=treatment2))
```



```
m3 <- lm(toc3 ~ treatment1 * treatment2 + assim3, data=dat)
summary(m3)
```



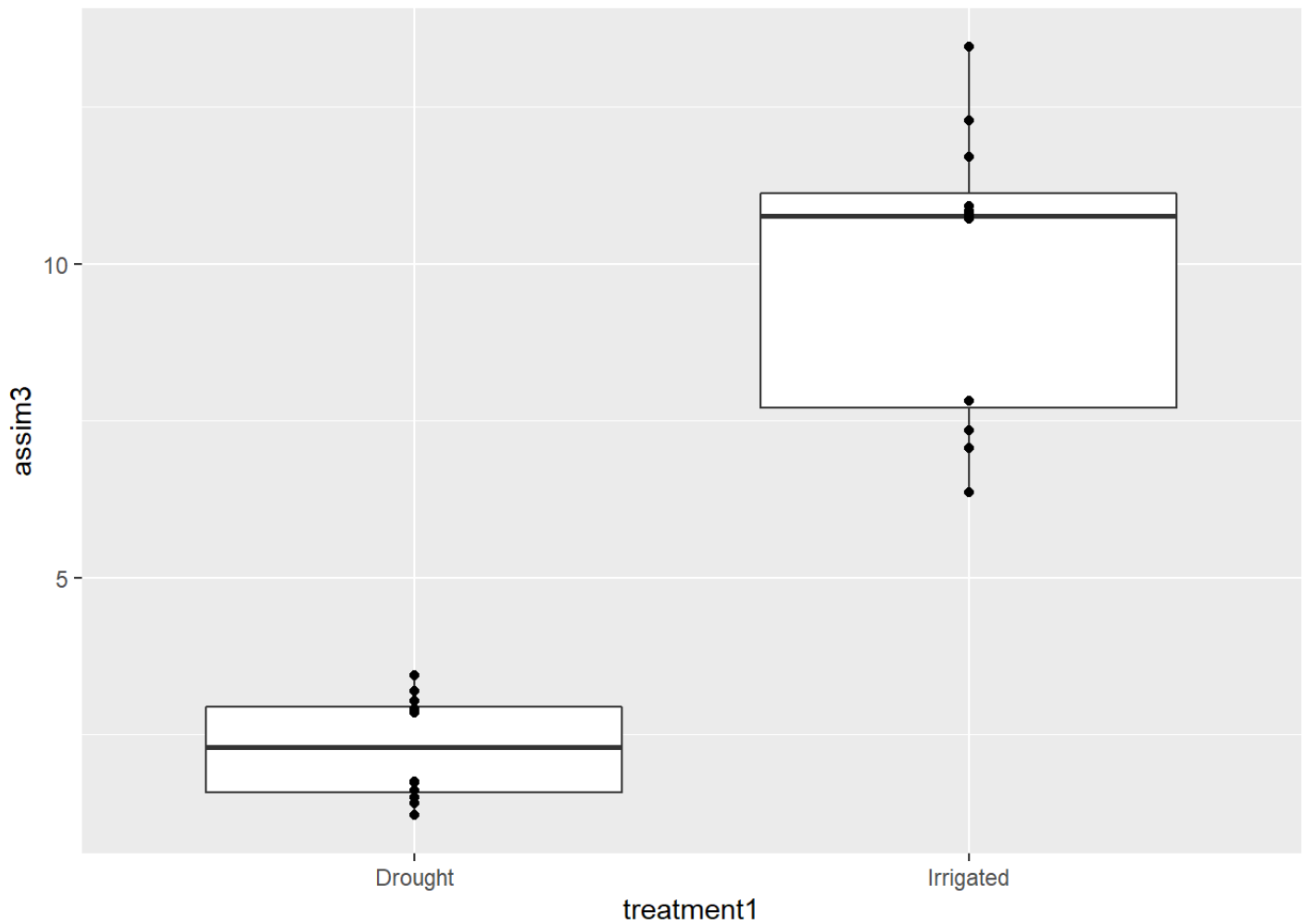
```
##
## Call:
## lm(formula = toc3 ~ treatment1 * treatment2 + assim3, data = dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.2044 -0.2272 -0.0385  0.2182  1.1778
##
## Coefficients:
##
##              Estimate Std. Error t value
## (Intercept)      1.54003    0.34931   4.409
## treatment1Irrigated      3.15160    0.62166   5.070
## treatment2with bacteria  -0.65534    0.36552  -1.793
## assim3             -0.36858    0.08211  -4.489
## treatment1Irrigated:treatment2with bacteria  1.93527    0.53733   3.602
##
##              Pr(>|t|)
## (Intercept)      0.000302 ***
## treatment1Irrigated      6.81e-05 ***
## treatment2with bacteria  0.088925 .
## assim3             0.000252 ***
## treatment1Irrigated:treatment2with bacteria  0.001901 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5952 on 19 degrees of freedom
## Multiple R-squared:  0.7379, Adjusted R-squared:  0.6828
## F-statistic: 13.37 on 4 and 19 DF,  p-value: 2.391e-05
```

```
emmeans(m3, pairwise ~ treatment1 * treatment2)
```

```
## $emmeans
## treatment1 treatment2      emmean      SE df lower.CL upper.CL
## Drought      w/o bacteria  -0.727  0.352  19      -1.46   0.00894
## Irrigated     w/o bacteria   2.425  0.359  19       1.67   3.17575
## Drought      with bacteria -1.382  0.450  19      -2.32  -0.44049
## Irrigated     with bacteria  3.705  0.442  19       2.78   4.62889
##
## Confidence level used: 0.95
##
## $contrasts
## contrast                                estimate      SE df t.ratio
## (Drought w/o bacteria) - (Irrigated w/o bacteria)  -3.152  0.622  19  -5.070
## (Drought w/o bacteria) - Drought with bacteria      0.655  0.366  19   1.793
## (Drought w/o bacteria) - Irrigated with bacteria   -4.432  0.711  19  -6.231
## (Irrigated w/o bacteria) - Drought with bacteria    3.807  0.729  19   5.224
## (Irrigated w/o bacteria) - Irrigated with bacteria  -1.280  0.359  19  -3.563
## Drought with bacteria - Irrigated with bacteria   -5.087  0.823  19  -6.184
## p.value
## 0.0004
## 0.3071
## <.0001
## 0.0003
## 0.0102
## <.0001
##
## P value adjustment: tukey method for comparing a family of 4 estimates
```

Assimilation by irrigation

```
ggplot(data=dat, aes(x=treatment1, y=assim3)) +
  geom_boxplot() +
  geom_point()
```



```
t.test(assim3 ~ treatment1, data=dat)
```

```
##  
## Welch Two Sample t-test  
##  
## data: assim3 by treatment1  
## t = -11.038, df = 13.804, p-value = 3.125e-08  
## alternative hypothesis: true difference in means between group Drought and group Irrigated is not equal to 0  
## 95 percent confidence interval:  
## -9.204549 -6.206186  
## sample estimates:  
## mean in group Drought mean in group Irrigated  
## 2.297496 10.002864
```