

BuckSugarExplr.R

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```
library(ggplot2)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##   filter, lag

## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union
```

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

```
bucksug15 <- read.csv("nectar analysis/data files/bucksugar15.csv", header = T)
bucksug16 <- read.csv("nectar analysis/data files/bucksugar16.csv", header = T)
bucksugboth <- rbind(bucksug15,bucksug16)
```

```
#Data summaries
```

```
summary(bucksug15)
```

```
##           date           plot    treatment      quad      BRIX
## 2015-06-23: 45   WSR10   : 47   C:208    WSR10NE: 14   Min.    : 2.0
## 2015-06-22: 42   WH12   : 45   H:208    WH12NW : 12   1st Qu.:46.0
## 2015-06-24: 38   EH4    : 42           WH12SE : 12   Median :53.0
## 2015-06-21: 37   CH5    : 39           WHSR9SW: 12   Mean   :50.6
## 2015-06-30: 35   WHSR9   : 39           EC3NE  : 11   3rd Qu.:60.0
## 2015-06-25: 31   EC3     : 38           EC3SW  : 11   Max.   :76.0
## (Other)      :188   (Other):166           (Other):344
##      mass
## Min.   :0.01179
## 1st Qu.:0.14346
## Median :0.23315
## Mean   :0.24262
## 3rd Qu.:0.32155
## Max.   :0.80931
##
```

```
summary(bucksug16)
```

```
##           date           plot    treatment      quad      BRIX
```

```
## 2016-06-23:49 WSR10 : 43 C:142 EHSR1SW: 14 Min. :36.00
## 2016-06-24:58 WHSR9 : 40 H:154 WSR10NE: 13 1st Qu.:51.00
## 2016-06-25:42 CC6 : 37 WSR10NW: 12 Median :58.00
## 2016-06-26:42 WH12 : 34 CC6NW : 11 Mean :57.18
## 2016-06-27:48 CH5 : 21 ESR2NE : 11 3rd Qu.:64.00
## 2016-06-29:44 CHSR8 : 21 WHSR9NE: 11 Max. :72.00
## 2016-06-30:13 (Other):100 (Other):224
## mass
## Min. :0.009774
## 1st Qu.:0.042091
## Median :0.060977
## Mean :0.065926
## 3rd Qu.:0.084478
## Max. :0.203829
##
```

```
summary(bucksugboth)
```

```
##      date      plot treatment      quad      BRIX
## 2016-06-24: 58 WSR10 : 90 C:350 WSR10NE: 27 Min. : 2.00
## 2016-06-23: 49 WH12 : 79 H:362 WSR10NW: 23 1st Qu.:48.00
## 2016-06-27: 48 WHSR9 : 79 EHSR1SW: 22 Median :55.00
## 2015-06-23: 45 CC6 : 71 WH12NW : 22 Mean :53.33
## 2016-06-29: 44 EH4 : 63 EH4NE : 21 3rd Qu.:62.00
## 2015-06-22: 42 CH5 : 60 WH12SE : 21 Max. :76.00
## (Other) :426 (Other):270 (Other):576
## mass
## Min. :0.009774
## 1st Qu.:0.063530
## Median :0.120498
## Mean :0.169165
## 3rd Qu.:0.260363
## Max. :0.809307
##
```

```
summarize(group_by(bucksug15, treatment), meanBRIX = mean(BRIX), sdBRIX = sd(BRIX))
```

```
## Source: local data frame [2 x 3]
##
##   treatment meanBRIX sdBRIX
##   (fctr)      (dbl)   (dbl)
## 1 C 45.91827 15.59908
## 2 H 55.27885 12.21582
```

```
summarize(group_by(bucksug16, treatment), meanBRIX = mean(BRIX), sdBRIX = sd(BRIX))
```

```
## Source: local data frame [2 x 3]
##
##   treatment meanBRIX sdBRIX
##   (fctr)      (dbl)   (dbl)
## 1 C 56.78169 8.291768
## 2 H 57.53896 7.460688
```

```
summarize(group_by(bucksugboth, treatment), meanBRIX = mean(BRIX), sdBRIX = sd(BRIX))
```

```
## Source: local data frame [2 x 3]
##
##   treatment meanBRIX    sdBRIX
##   (fctr)      (dbl)      (dbl)
## 1         C 50.32571 14.16470
## 2         H 56.24033 10.50763
```

```
summarize(group_by(bucksug15, treatment), meanmass = mean(mass), sdmass = sd(mass))
```

```
## Source: local data frame [2 x 3]
##
##   treatment  meanmass    sdmass
##   (fctr)      (dbl)      (dbl)
## 1         C 0.2549647 0.1252974
## 2         H 0.2302839 0.1242567
```

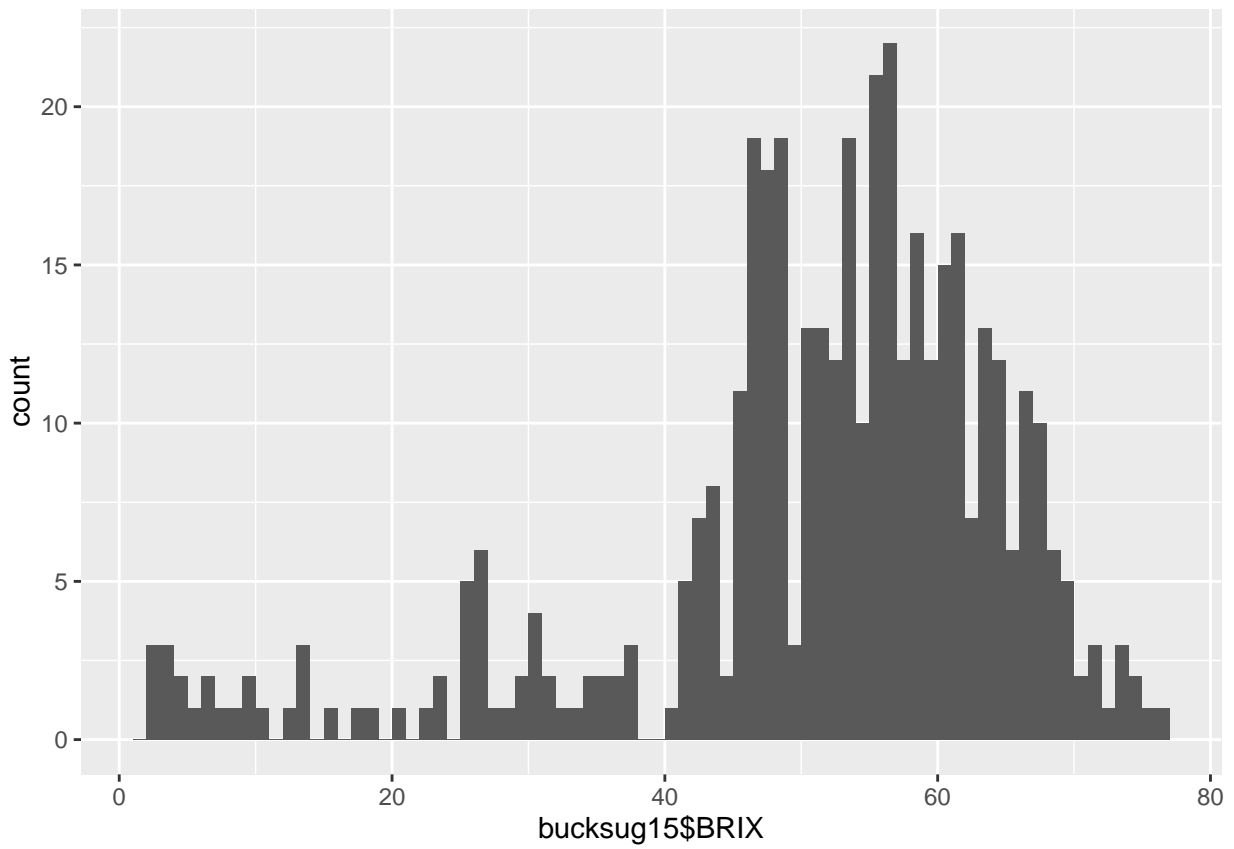
```
summarize(group_by(bucksug16, treatment), meanmass = mean(mass), sdmass = sd(mass))
```

```
## Source: local data frame [2 x 3]
##
##   treatment  meanmass    sdmass
##   (fctr)      (dbl)      (dbl)
## 1         C 0.06895813 0.03252060
## 2         H 0.06313010 0.02899796
```

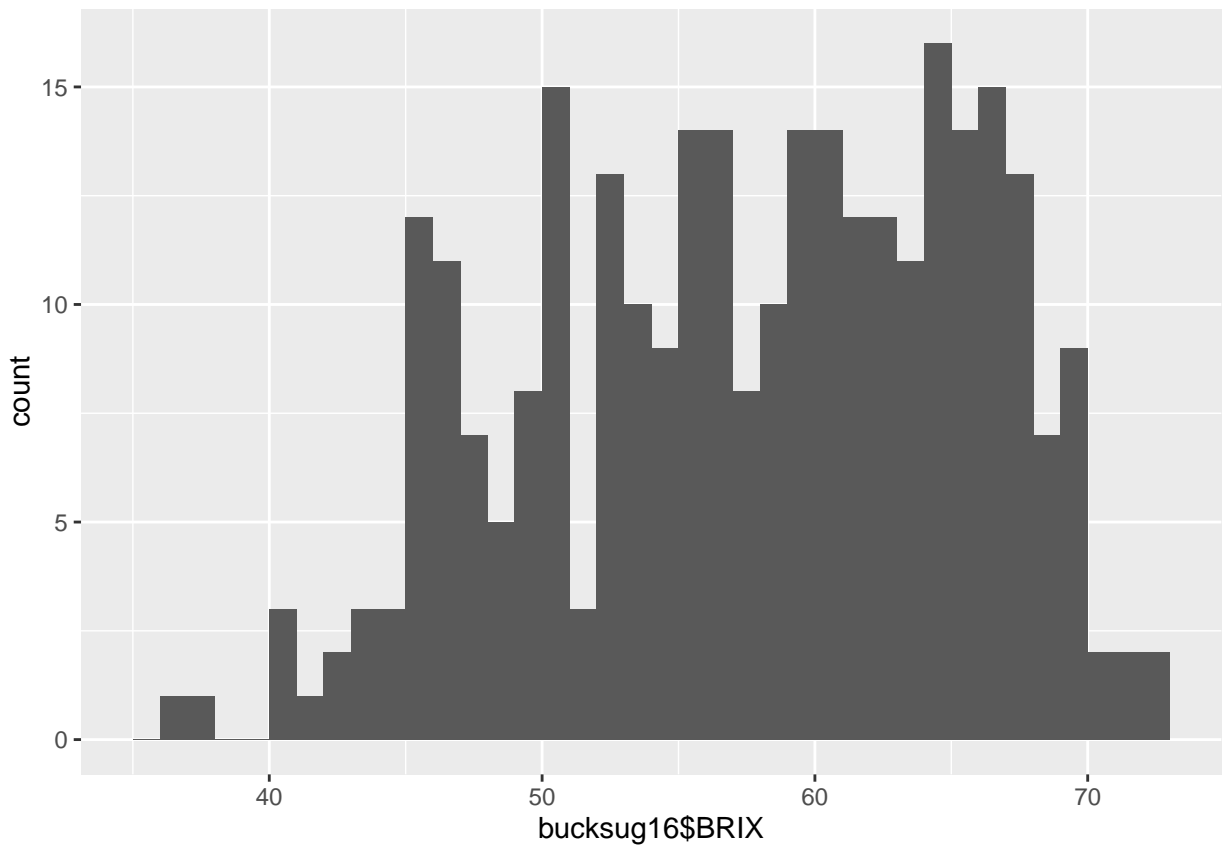
```
summarize(group_by(bucksugboth, treatment), meanmass = mean(mass), sdmass = sd(mass))
```

```
## Source: local data frame [2 x 3]
##
##   treatment  meanmass    sdmass
##   (fctr)      (dbl)      (dbl)
## 1         C 0.1794991 0.1345545
## 2         H 0.1591743 0.1267211
```

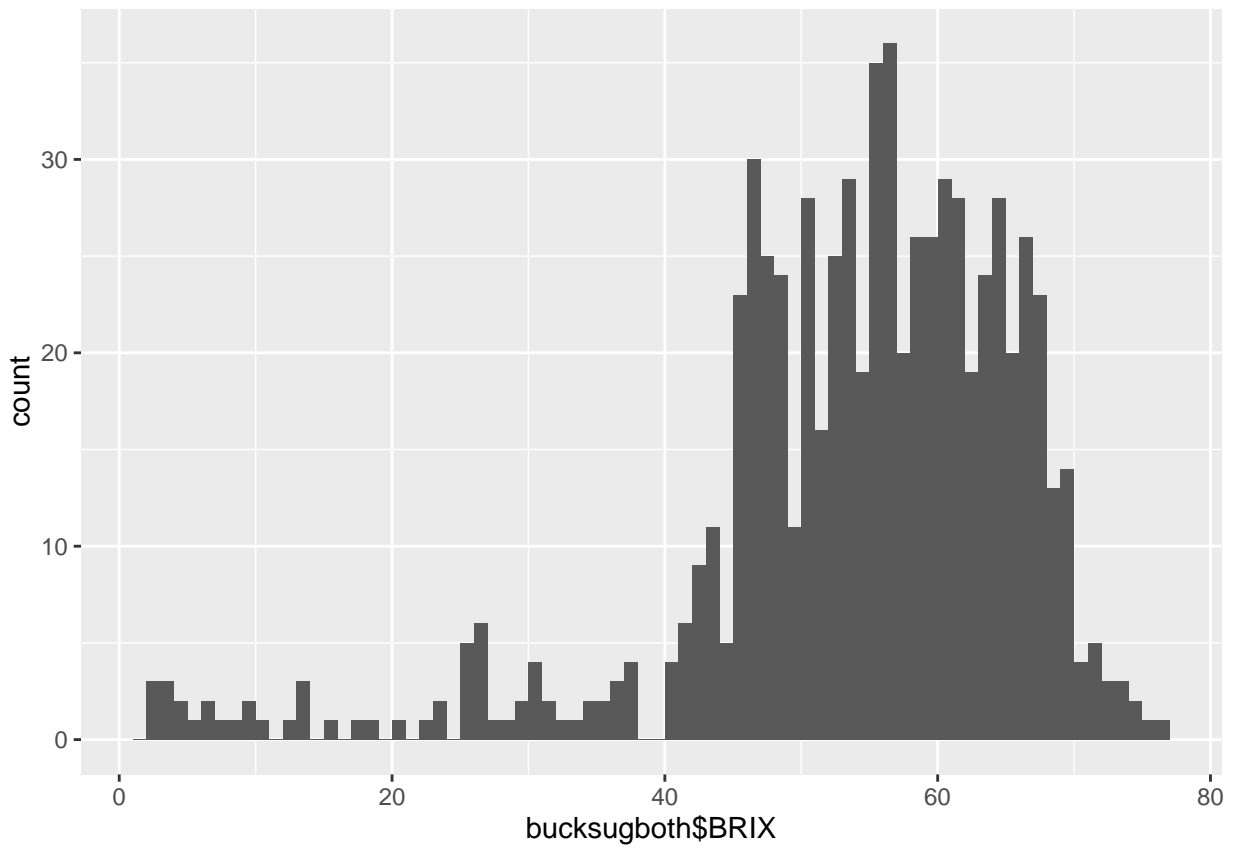
```
qplot(bucksug15$BRIX, binwidth = 1)
```



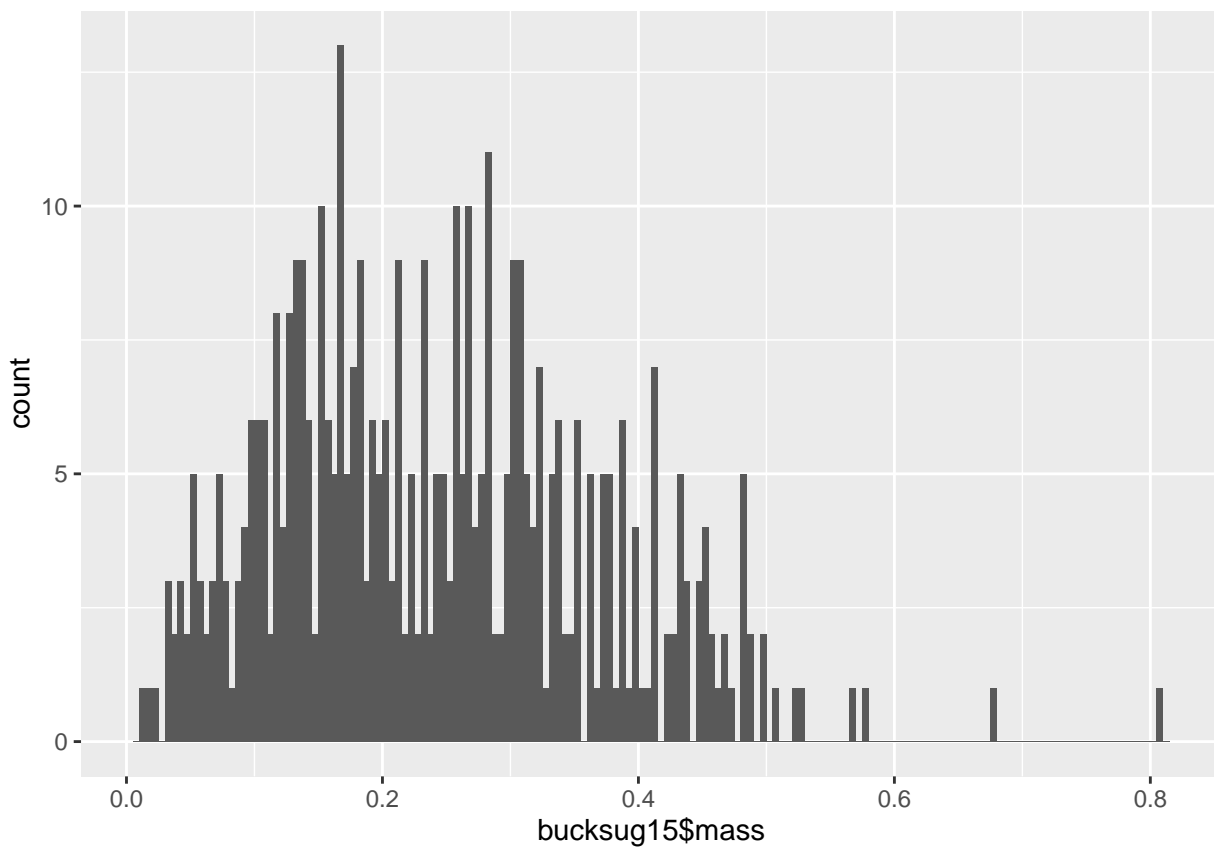
```
qplot(bucksug16$BRIX, binwidth = 1)
```



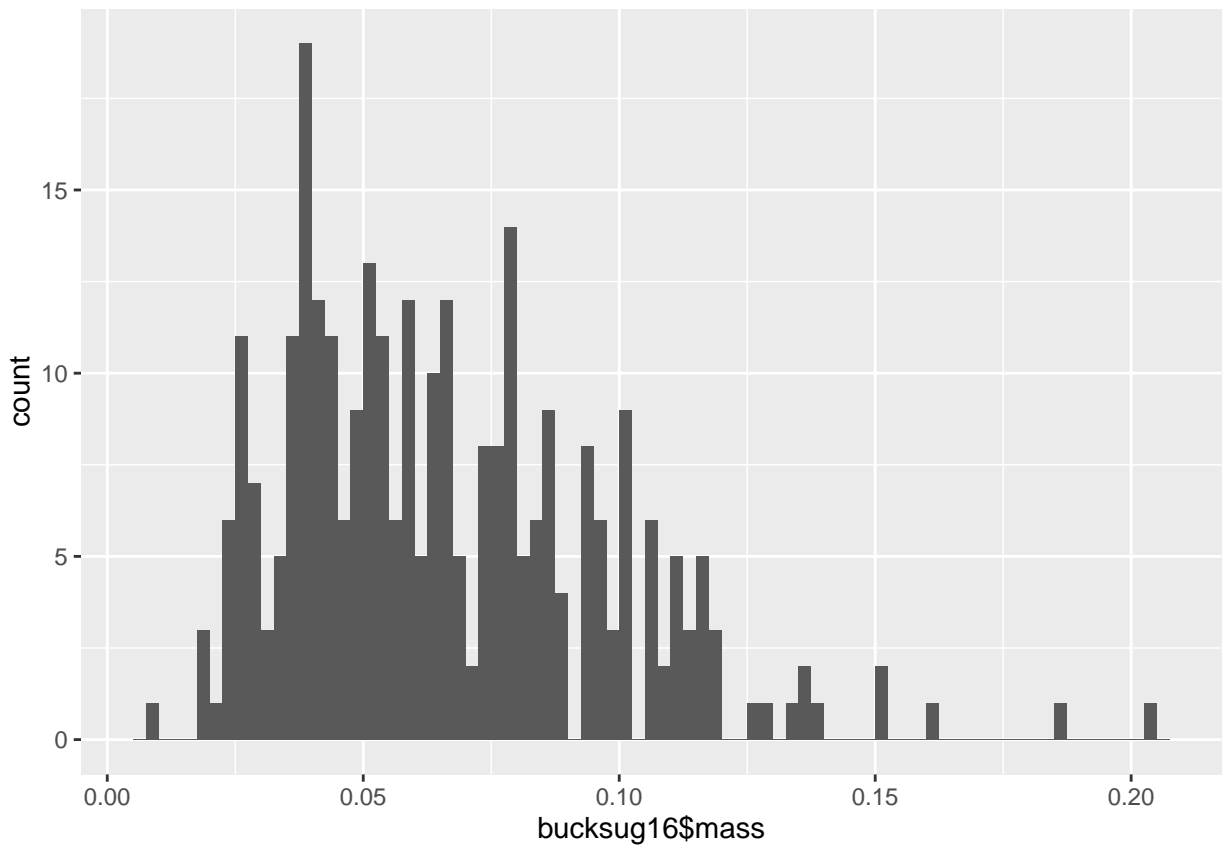
```
qplot(bucksugboth$BRIX, binwidth = 1)
```



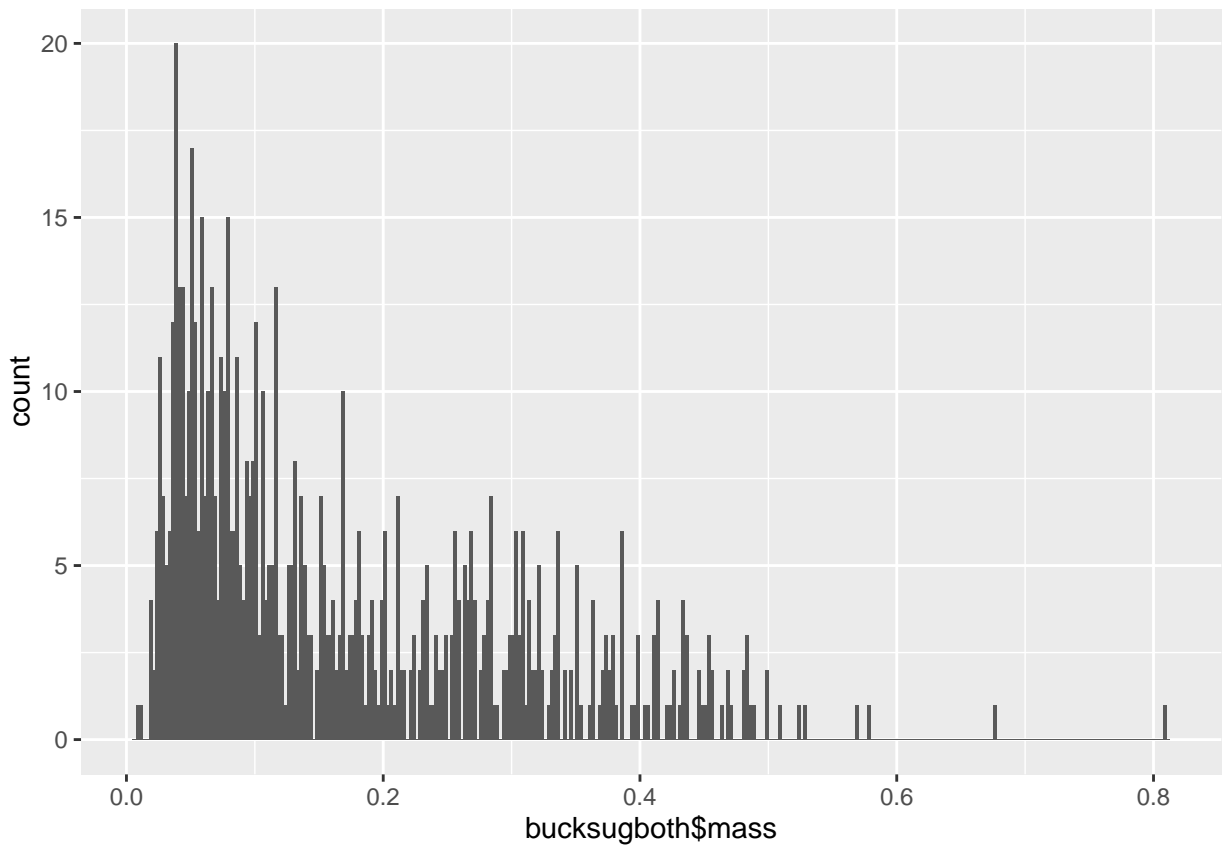
```
qplot(bucksug15$mass, binwidth = 0.005)
```



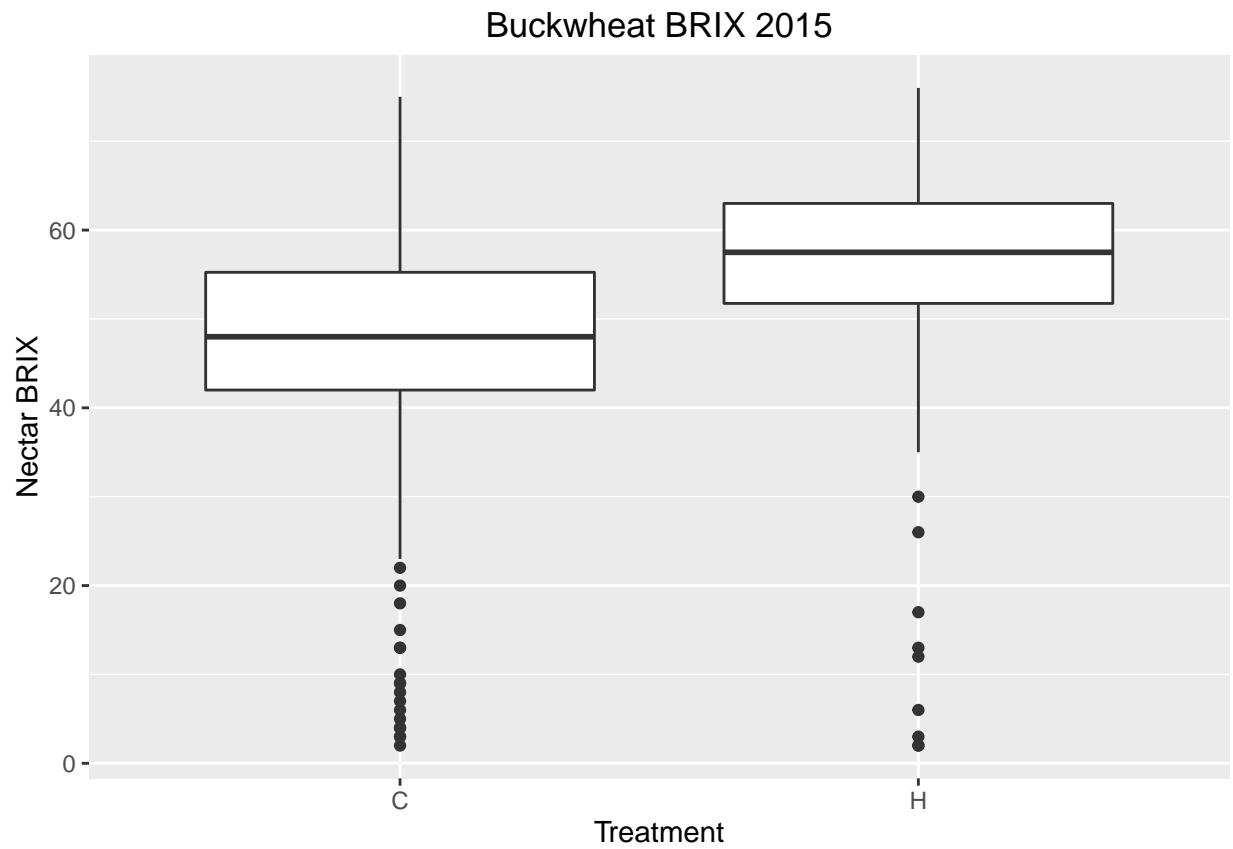
```
qplot(bucksug16$mass, binwidth = .0025)
```



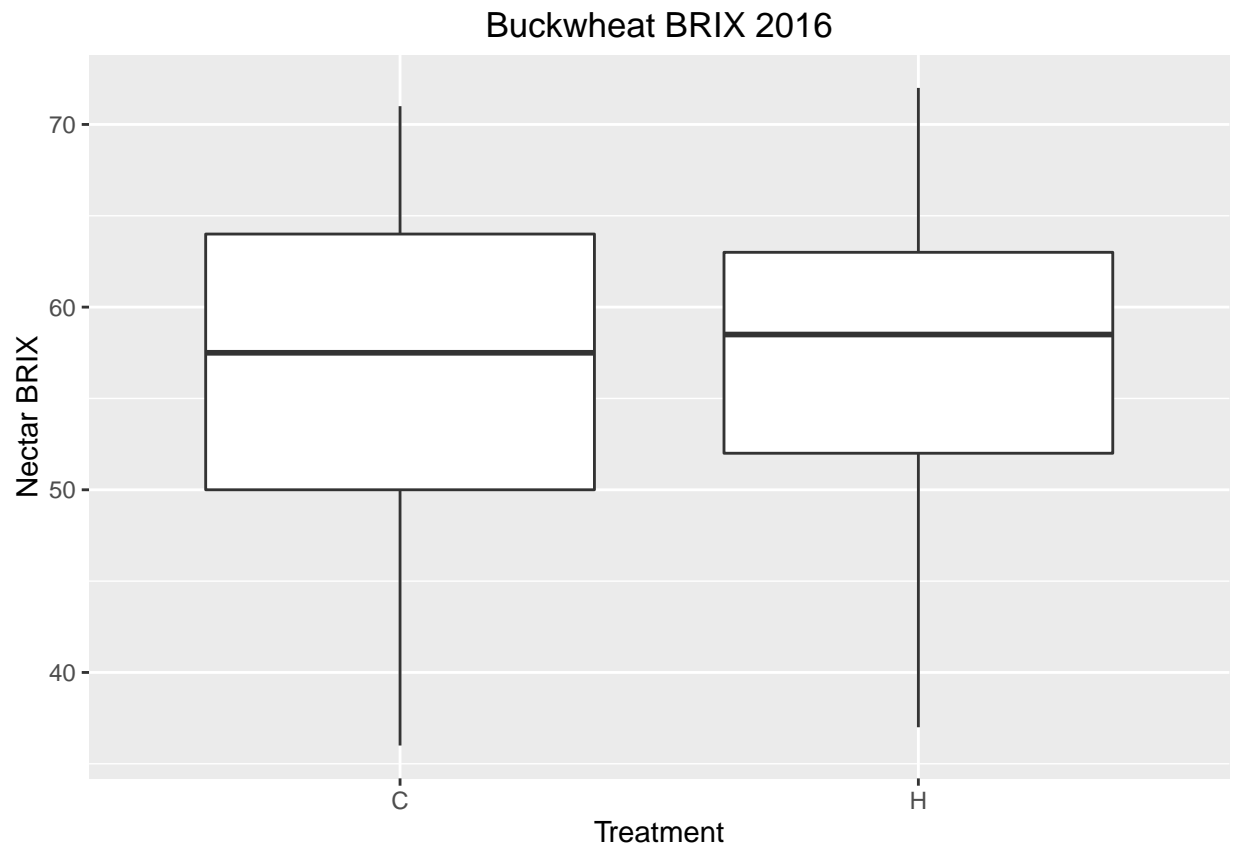
```
qplot(bucksugboth$mass, binwidth = .0025)
```

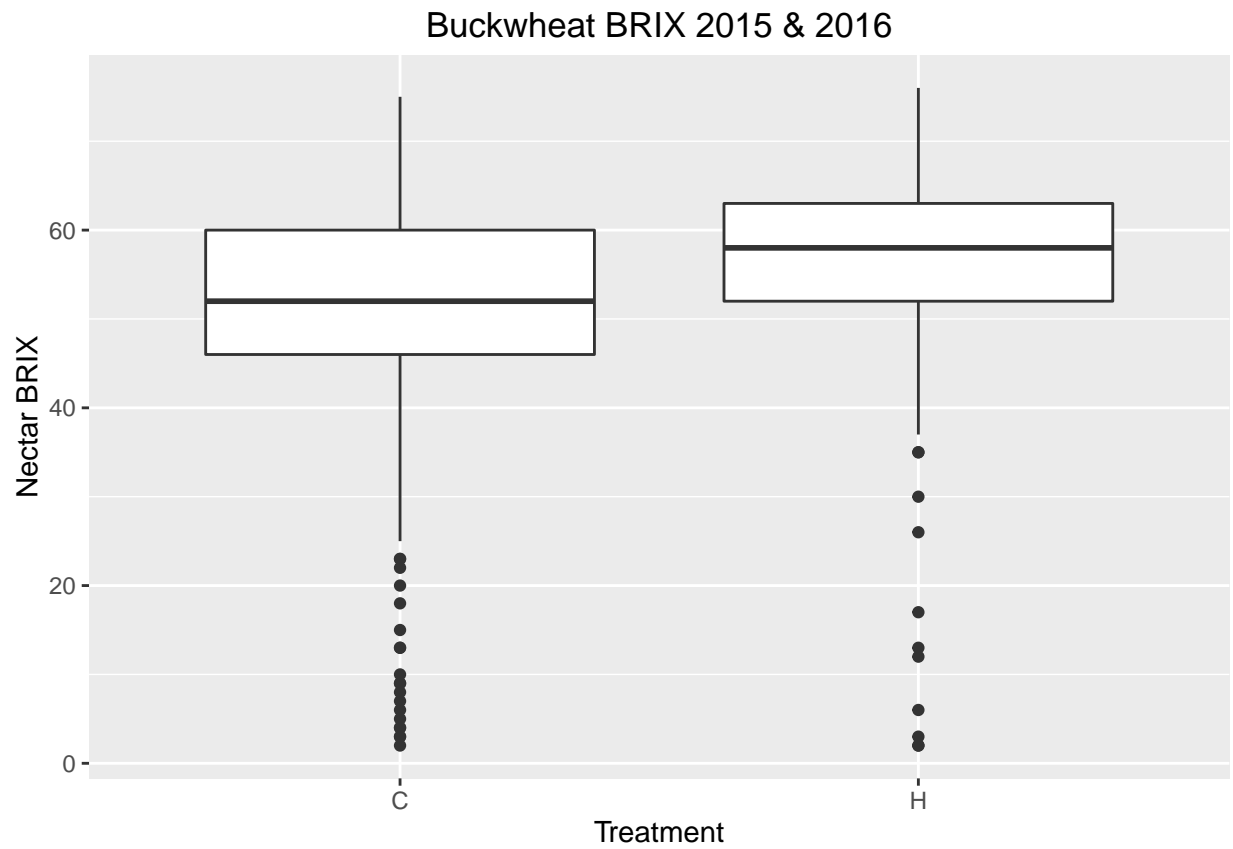
```
ggplot(bucksug15, aes(x=treatment, y=BRIX)) + geom_boxplot() +
  xlab("Treatment") +
  ylab("Nectar BRIX") + ggtitle("Buckwheat BRIX 2015")
```



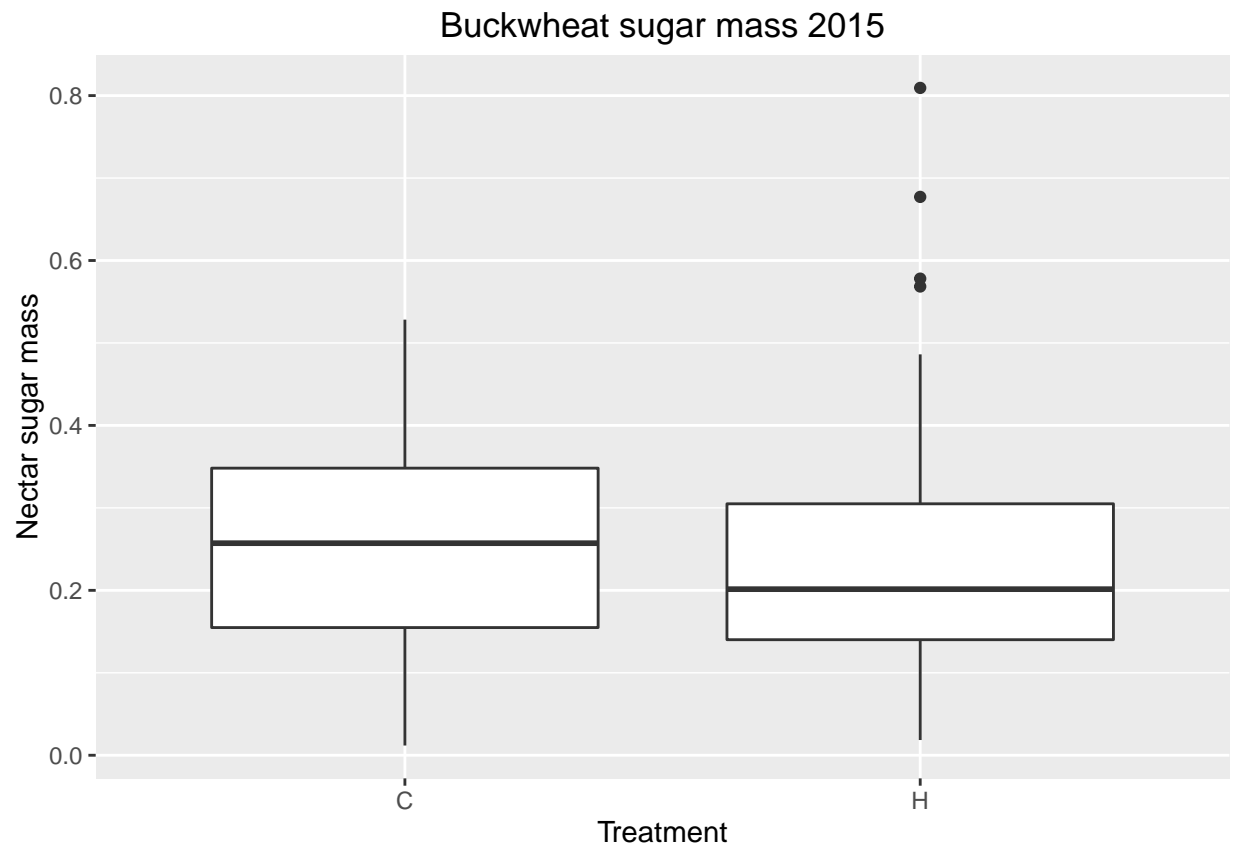
```
ggplot(bucksug16, aes(x=treatment, y=BRIX)) + geom_boxplot() +  
  xlab("Treatment") +  
  ylab("Nectar BRIX") + ggtitle("Buckwheat BRIX 2016")
```



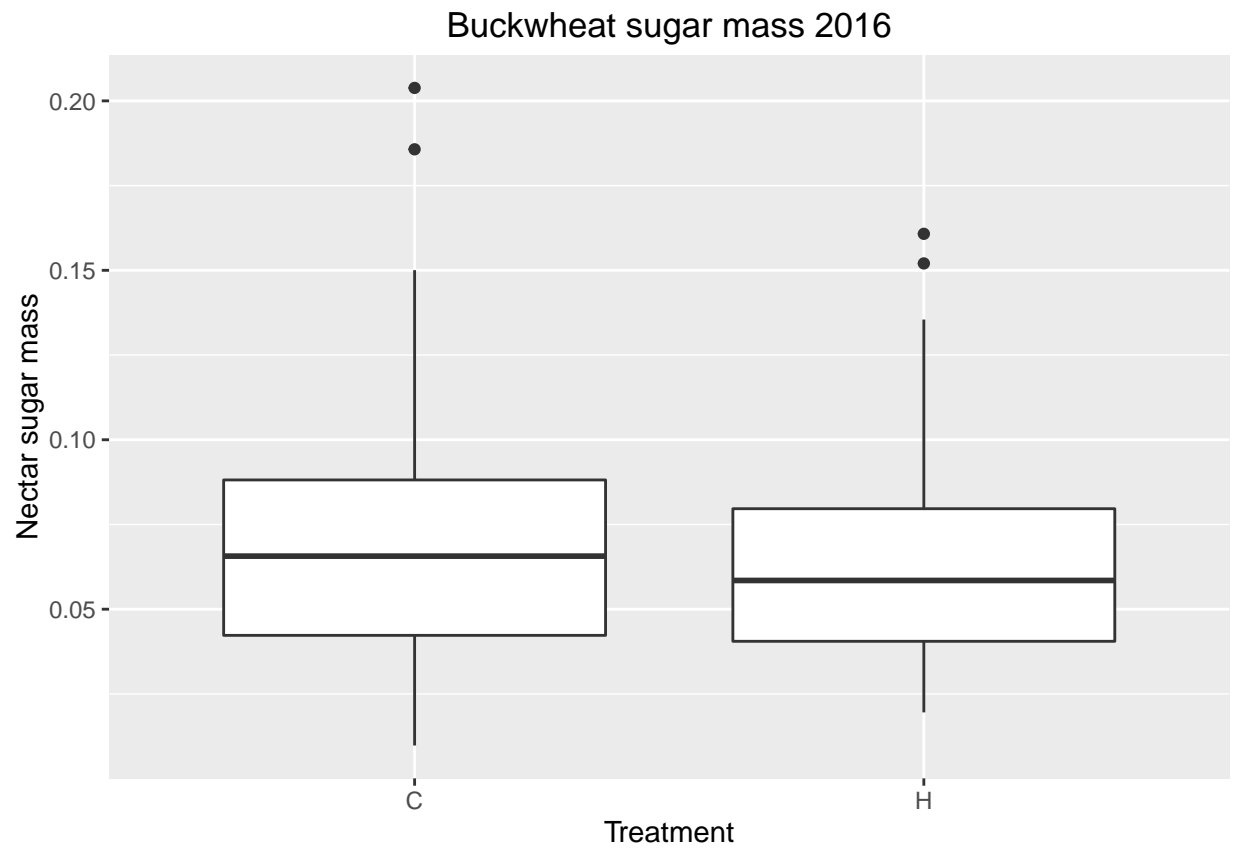
```
ggplot(bucksugboth, aes(x=treatment, y=BRIX)) + geom_boxplot() +  
  xlab("Treatment") +  
  ylab("Nectar BRIX") + ggtitle("Buckwheat BRIX 2015 & 2016")
```



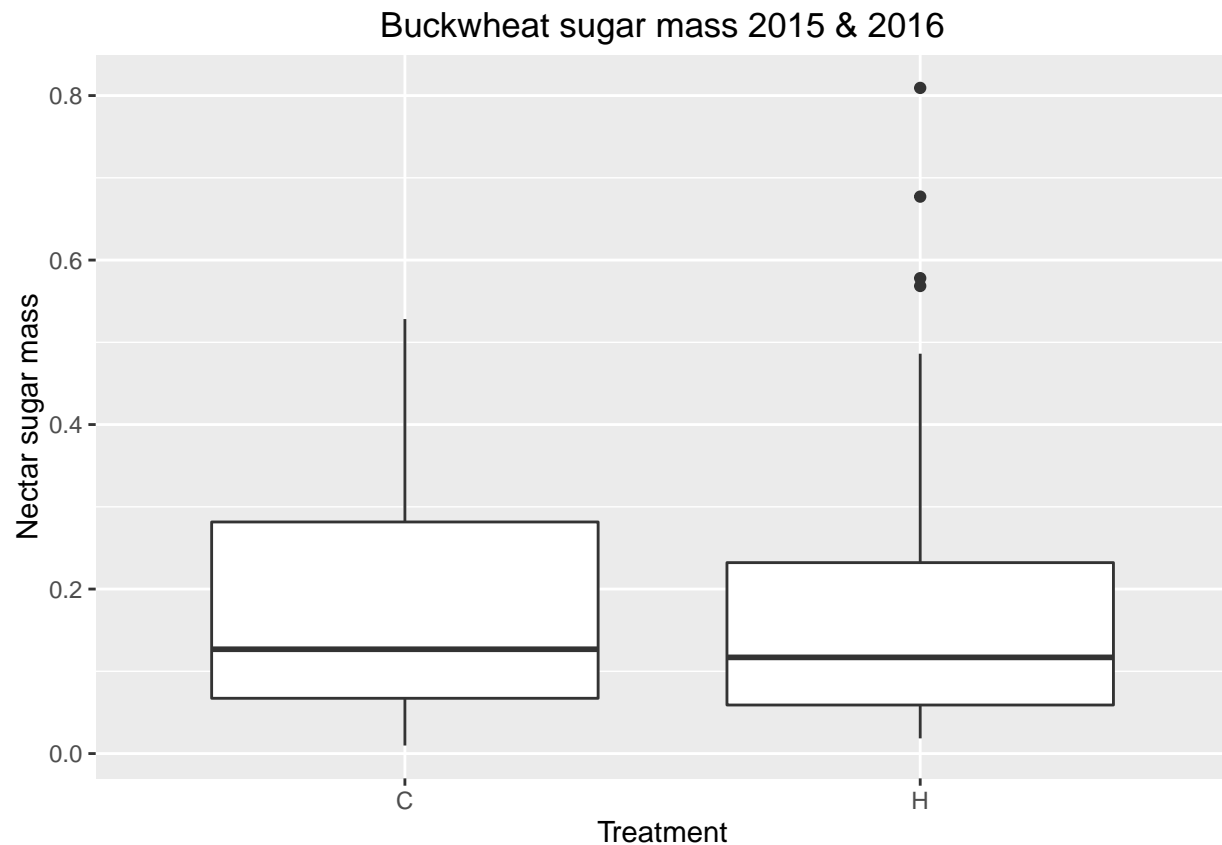
```
ggplot(bucksug15, aes(x=treatment, y=mass)) + geom_boxplot() +  
  xlab("Treatment") +  
  ylab("Nectar sugar mass") + ggtitle("Buckwheat sugar mass 2015")
```



```
ggplot(bucksug16, aes(x=treatment, y=mass)) + geom_boxplot() +  
  xlab("Treatment") +  
  ylab("Nectar sugar mass") + ggtitle("Buckwheat sugar mass 2016")
```



```
ggplot(bucksugboth, aes(x=treatment, y=mass)) + geom_boxplot() +  
  xlab("Treatment") +  
  ylab("Nectar sugar mass") + ggtitle("Buckwheat sugar mass 2015 & 2016")
```



Homoscedastic?

```
var15C <- sd(bucksug15$BRIX[bucksug15$treatment=="C"])^2
var15H <- sd(bucksug15$BRIX[bucksug15$treatment=="H"])^2
ratio15 <- var15C/var15H
ratio15
```

```
## [1] 1.630621
```

```
var16C <- sd(bucksug16$BRIX[bucksug16$treatment=="C"])^2
var16H <- sd(bucksug16$BRIX[bucksug16$treatment=="H"])^2
ratio16 <- var16C/var16H
ratio16
```

```
## [1] 1.235198
```

```
varbothC <- sd(bucksugboth$BRIX[bucksugboth$treatment=="C"])^2
varbothH <- sd(bucksugboth$BRIX[bucksugboth$treatment=="H"])^2
ratioboth <- varbothC/varbothH
ratioboth
```

```
## [1] 1.81721
```

```

var15C <- sd(bucksug15$mass[bucksug15$treatment=="C"])^2
var15H <- sd(bucksug15$mass[bucksug15$treatment=="H"])^2
ratio15 <- var15C/var15H
ratio15

```

```
## [1] 1.01682
```

```

var16C <- sd(bucksug16$mass[bucksug16$treatment=="C"])^2
var16H <- sd(bucksug16$mass[bucksug16$treatment=="H"])^2
ratio16 <- var16C/var16H
ratio16

```

```
## [1] 1.257715
```

```

varbothC <- sd(bucksugboth$mass[bucksugboth$treatment=="C"])^2
varbothH <- sd(bucksugboth$mass[bucksugboth$treatment=="H"])^2
ratioboth <- varbothC/varbothH
ratioboth

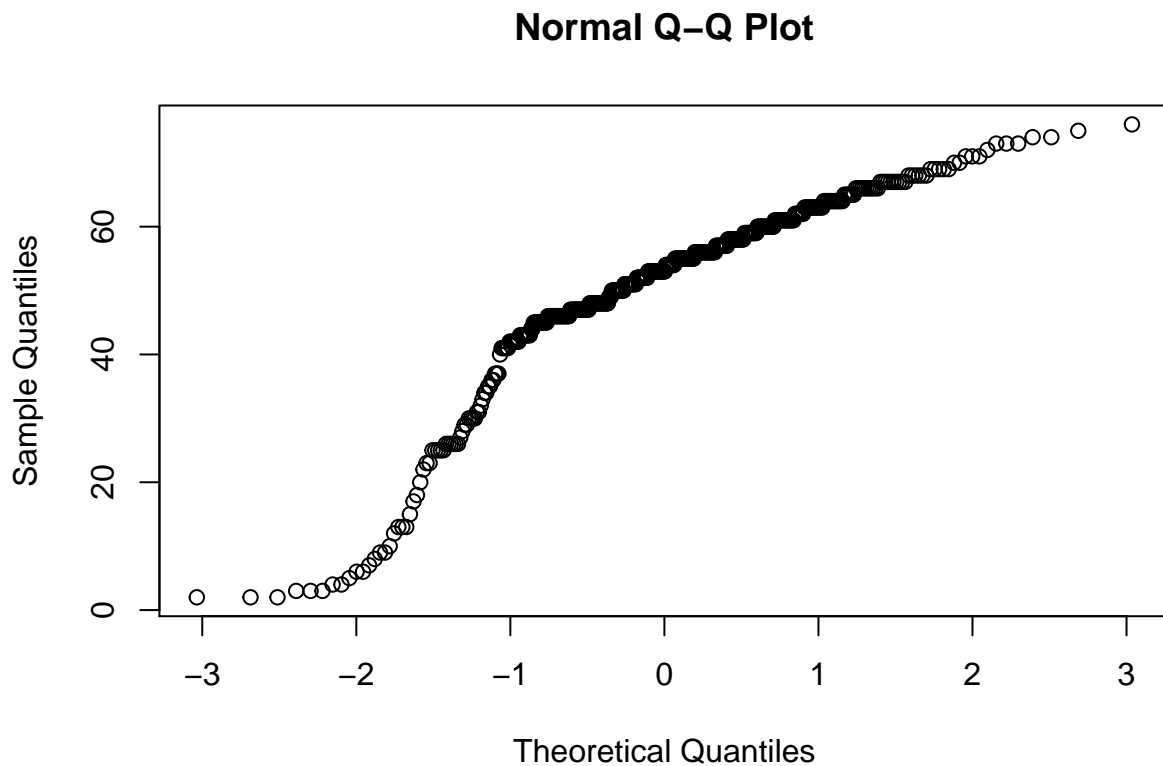
```

```
## [1] 1.127454
```

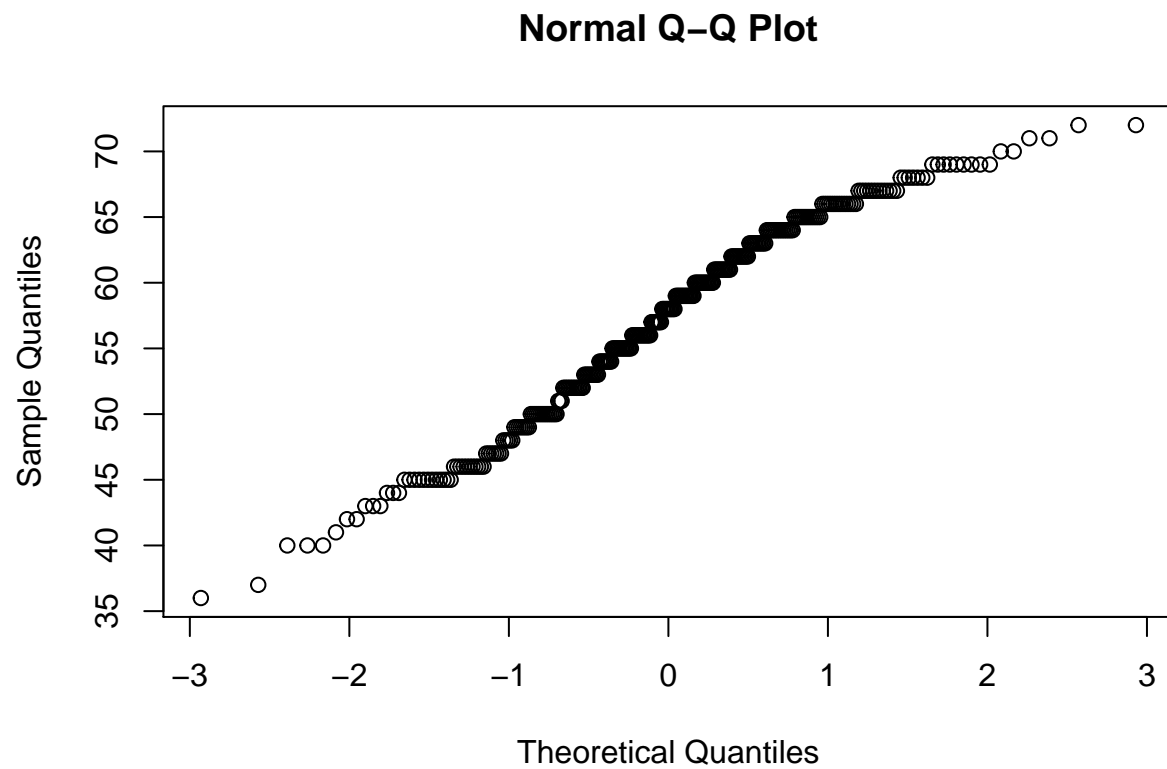
```

# Q-Q plots
qqnorm(bucksug15$BRIX)

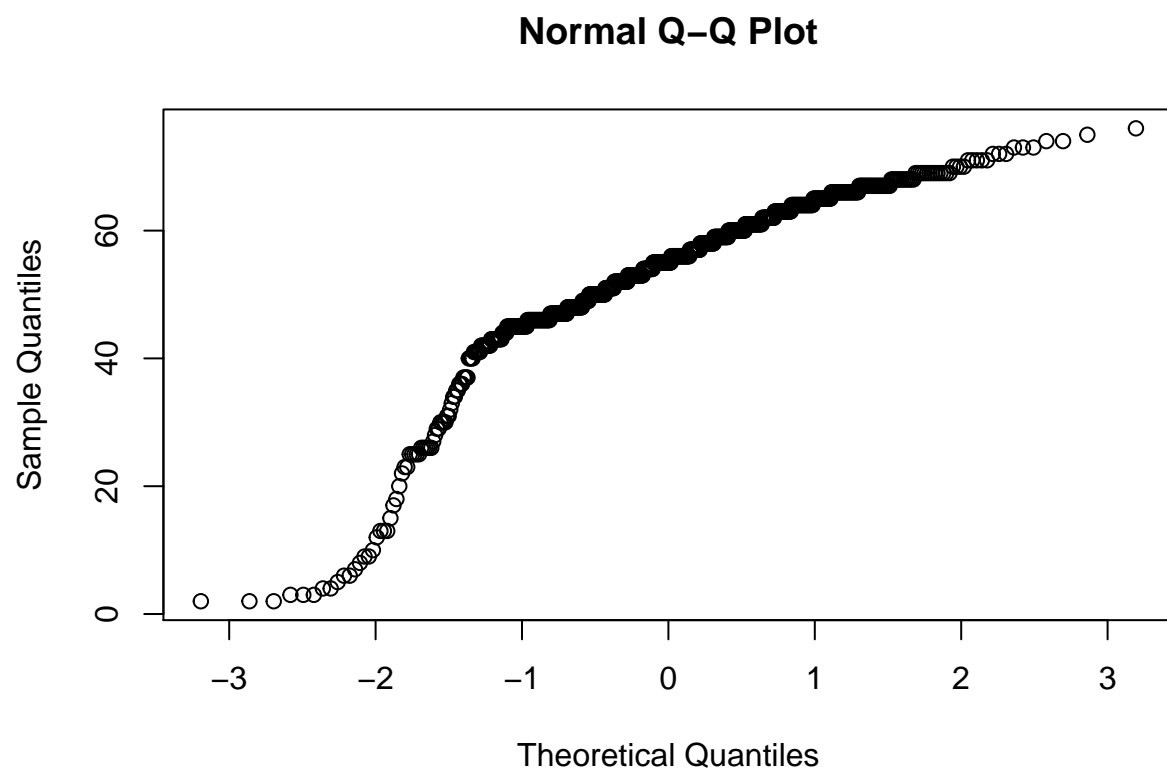
```




```
qqnorm(bucksug16$BRIX)
```

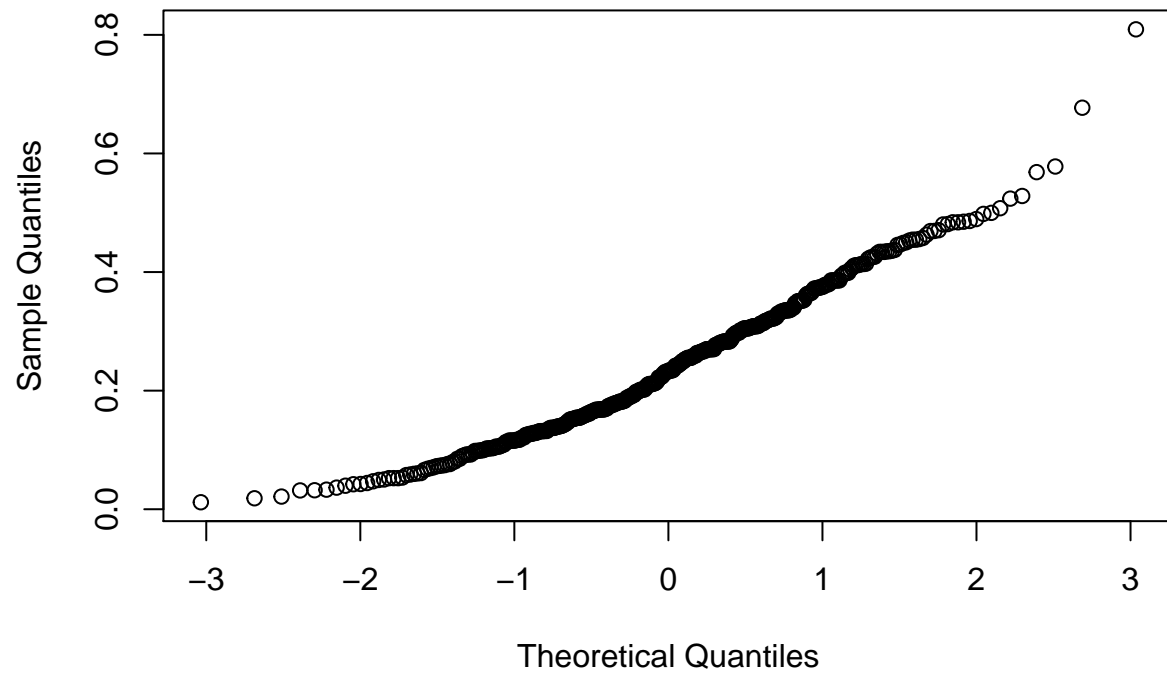


```
qqnorm(bucksugboth$BRIX)
```



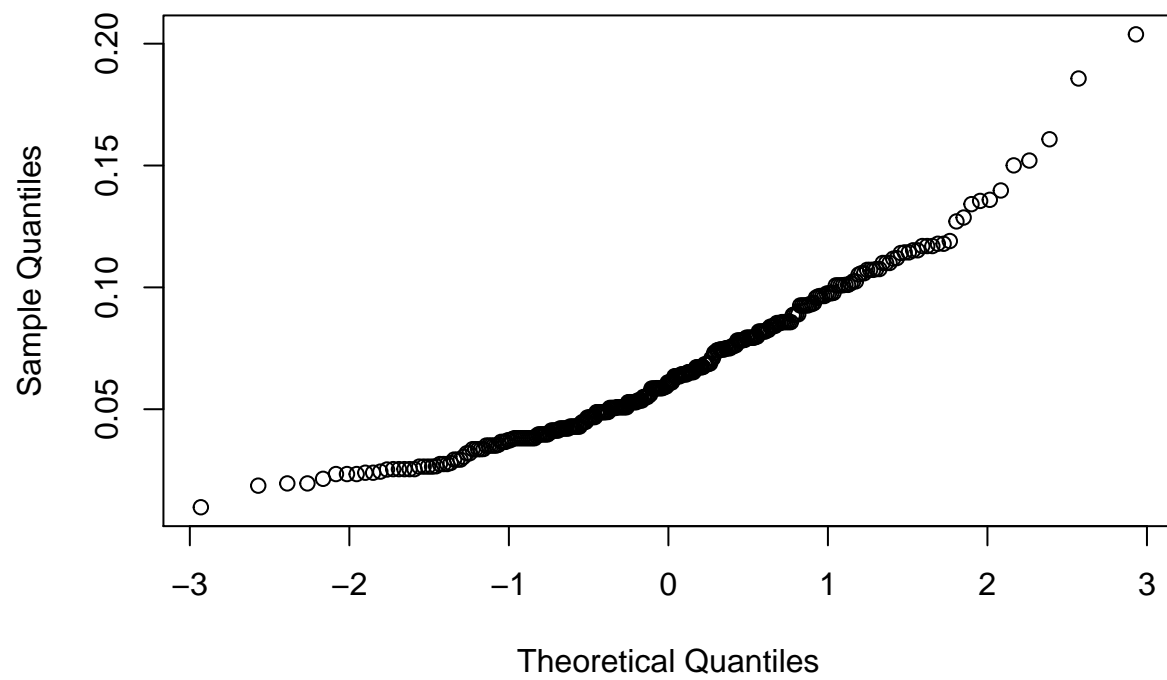
```
qqnorm(bucksug15$mass)
```

Normal Q-Q Plot



```
qqnorm(bucksug16$mass)
```

Normal Q-Q Plot



```
qqnorm(bucksugboth$mass)
```

Normal Q-Q Plot

