uhuru dataset

2022-10-04

1. Describing the data that we are using

We are using the data set from this study

The Data From UHURU Acacia Survey is based on a study of assessing both direct and indirect consequences of the removal of nonrandom species of the environment. The UHURU consists of three wired electric fences to provoke herbivore exclusion treatments this also has a control group which is un-fenced. The units that we are using are for height meters and for weight kg. These three Fenced treatments include "Mega" excludes elephants and giraffes only; "Meso" excludes both megaherbivores and mesoherbivores, ca. 40 kg and larger; and"Total" excludes all herbivores > 5 kg.

2. reading the data table into R

First make sure we are in the correct working directory "getwd()" "/Users/atziri/Bio 195-197/Data Science"

if it is not right set the working directory with 'setwd()'

how do i test where the computer is ?

```
read.csv(file = "/Users/atziri/Bio 195-197/Data Science/raw-data/ACACIA_DREPANOLOBIUM_SURVEY.txt", sep =
```

```
##     SURVEY YEAR  SITE BLOCK TREATMENT    PLOT   ID HEIGHT AXIS1 AXIS2 CIRC
## 1        1 2012 SOUTH     1     TOTAL S1TOTAL  581   2.25  2.75  2.15 20.0
## 2        1 2012 SOUTH     1     TOTAL S1TOTAL  582   2.65  4.10  3.90 28.0
## 3        1 2012 SOUTH     1     TOTAL S1TOTAL 3111    1.5  1.70  0.85 17.0
## 4        1 2012 SOUTH     1     TOTAL S1TOTAL 3112   2.01  1.80  1.60 12.0
## 5        1 2012 SOUTH     1     TOTAL S1TOTAL 3113   1.75  1.84  1.42 13.0
## 6        1 2012 SOUTH     1     TOTAL S1TOTAL 3114   1.65  1.62  0.85 15.0
## 7        1 2012 SOUTH     1     TOTAL S1TOTAL 3115    1.2  1.95  0.90  9.0
## 8        1 2012 SOUTH     1     TOTAL S1TOTAL 3199   1.45  2.00  1.75 12.2
## 9        1 2012 SOUTH     1      MESO  S1MESO  941   1.87  2.15  1.82 13.0
## 10       1 2012 SOUTH     1      MESO  S1MESO  942   2.38  5.55  4.82 35.0
## 11       1 2012 SOUTH     1      MESO  S1MESO  943   2.58  4.90  4.24 24.0
## 12       1 2012 SOUTH     1      MESO  S1MESO  944   2.65  3.75  3.10 27.0
## 13       1 2012 SOUTH     1      MESO  S1MESO  946   2.35  2.34  2.05 20.0
## 14       1 2012 SOUTH     1      MESO  S1MESO  947   1.88  2.10  1.85 28.0
## 15       1 2012 SOUTH     1      MESO  S1MESO 3116   2.32  3.05  2.63 30.0
## 16       1 2012 SOUTH     1      MESO  S1MESO 3117   2.39  2.21  2.10 13.0
## 17       1 2012 SOUTH     1      MESO  S1MESO 3118    2.2  1.80  1.50 10.0
## 18       1 2012 SOUTH     1      MESO  S1MESO 3119   1.05  0.90  0.55  8.0
## 19       1 2012 SOUTH     1      MESO  S1MESO 3120      2  1.25  1.20 10.0
## 20       1 2012 SOUTH     1      MESO  S1MESO 3131   1.28  1.14  1.00 10.0
## 21       1 2012 SOUTH     2      OPEN  S2OPEN  341   dead    NA    NA   NA
## 22       1 2012 SOUTH     2     TOTAL S2TOTAL 3178    1.4  2.50  2.15 18.0
```

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## 23       1 2012 SOUTH     2     TOTAL S2TOTAL  101    1.9  3.31  2.65 15.0
## 24       1 2012 SOUTH     2     TOTAL S2TOTAL  102   1.75  2.70  2.55 16.0
## 25       1 2012 SOUTH     2     TOTAL S2TOTAL  103    1.8  2.75  2.30 16.0
## 26       1 2012 SOUTH     2     TOTAL S2TOTAL  104    2.7  4.05  4.00 35.2
## 27       1 2012 SOUTH     2     TOTAL S2TOTAL  105   2.02  2.85  1.49 17.0
## 28       1 2012 SOUTH     2     TOTAL S2TOTAL  108    1.9  3.10  2.85 19.0
## 29       1 2012 SOUTH     2     TOTAL S2TOTAL  109   1.85  2.45  1.90 19.0
## 30       1 2012 SOUTH     2     TOTAL S2TOTAL  110   1.65  1.90  1.54 17.0
## 31       1 2012 SOUTH     2     TOTAL S2TOTAL  111    1.4  2.35  1.45 14.0
## 32       1 2012 SOUTH     2     TOTAL S2TOTAL  113    2.5  3.25  2.30 22.0
## 33       1 2012 SOUTH     2     TOTAL S2TOTAL  115   2.05  5.40  4.50 33.0
## 34       1 2012 SOUTH     2     TOTAL S2TOTAL  116   2.26  3.50  3.10 33.0
## 35       1 2012 SOUTH     2     TOTAL S2TOTAL  117   2.13  2.40  2.30 20.0
## 36       1 2012 SOUTH     2     TOTAL S2TOTAL  118    1.8  3.15  2.55 22.0
## 37       1 2012 SOUTH     2     TOTAL S2TOTAL 1211   1.85  2.00  2.27 20.0
## 38       1 2012 SOUTH     2     TOTAL S2TOTAL 1212    1.5  2.15  1.80 15.0
## 39       1 2012 SOUTH     2     TOTAL S2TOTAL 1213   1.87  2.34  2.05 13.0
## 40       1 2012 SOUTH     2     TOTAL S2TOTAL 1214   1.58  1.28  0.75 11.0
## 41       1 2012 SOUTH     2     TOTAL S2TOTAL 1215   2.05  2.10  1.75 17.0
## 42       1 2012 SOUTH     2     TOTAL S2TOTAL 1216   1.75  2.45  3.28 16.0
## 43       1 2012 SOUTH     2     TOTAL S2TOTAL 1217   1.49  1.50  1.45 13.0
## 44       1 2012 SOUTH     2     TOTAL S2TOTAL 1218   1.28  2.00  0.90 10.0
## 45       1 2012 SOUTH     2     TOTAL S2TOTAL 1219   1.49  2.35  1.65 13.0
## 46       1 2012 SOUTH     2     TOTAL S2TOTAL 1220   1.07  1.20  0.95 11.0
## 47       1 2012 SOUTH     2     TOTAL S2TOTAL 1231   1.48  1.25  1.20  9.0
## 48       1 2012 SOUTH     2     TOTAL S2TOTAL 1232   1.25  1.25  0.90 10.0
## 49       1 2012 SOUTH     2     TOTAL S2TOTAL 1233   1.41  1.41  1.40 14.0
## 50       1 2012 SOUTH     2     TOTAL S2TOTAL 1234    1.6  1.60  1.30 13.0
## 51       1 2012 SOUTH     2     TOTAL S2TOTAL 1235    1.2  1.20  1.30 14.0
## 52       1 2012 SOUTH     2     TOTAL S2TOTAL 1236   1.49  1.49  1.20  8.0
## 53       1 2012 SOUTH     2     TOTAL S2TOTAL 1237    1.5  1.50  1.50 14.0
## 54       1 2012 SOUTH     2     TOTAL S2TOTAL 1238   1.65  1.65  2.00 20.0
## 55       1 2012 SOUTH     2     TOTAL S2TOTAL 1239   1.13  1.13  1.20 10.0
## 56       1 2012 SOUTH     2     TOTAL S2TOTAL 1240   1.25  1.25  0.90 10.0
## 57       1 2012 SOUTH     2     TOTAL S2TOTAL 1251    1.1  1.20  1.10 10.0
## 58       1 2012 SOUTH     2     TOTAL S2TOTAL 1252    2.2  2.70  2.40 25.0
## 59       1 2012 SOUTH     2     TOTAL S2TOTAL 1253   1.45  1.65  1.25 10.0
## 60       1 2012 SOUTH     2     TOTAL S2TOTAL 1254    1.6  2.45  2.10 13.0
## 61       1 2012 SOUTH     2     TOTAL S2TOTAL 1255   1.55  2.40  1.80 13.0
## 62       1 2012 SOUTH     2     TOTAL S2TOTAL 1256    1.5  2.40  2.15 13.0
## 63       1 2012 SOUTH     2     TOTAL S2TOTAL 1257   1.03  1.20  1.00 10.0
## 64       1 2012 SOUTH     2     TOTAL S2TOTAL 1258   2.14  1.90  1.70 13.0
## 65       1 2012 SOUTH     2     TOTAL S2TOTAL 1259    1.2  1.90  1.65 12.0
## 66       1 2012 SOUTH     2     TOTAL S2TOTAL 1260   1.05  1.10  1.00  9.0
## 67       1 2012 SOUTH     2     TOTAL S2TOTAL 2131    1.8  2.60  2.40 15.0
## 68       1 2012 SOUTH     2     TOTAL S2TOTAL 2132    1.2  1.00  0.95  7.0
## 69       1 2012 SOUTH     2     TOTAL S2TOTAL 2133   1.75  1.40  1.10 10.0
## 70       1 2012 SOUTH     2     TOTAL S2TOTAL 2134   1.45  3.10  1.80 10.0
## 71       1 2012 SOUTH     2     TOTAL S2TOTAL 2135   1.17  1.20  1.10  5.0
## 72       1 2012 SOUTH     2     TOTAL S2TOTAL 2136   2.15  3.10  2.58 22.0
## 73       1 2012 SOUTH     2     TOTAL S2TOTAL 2137    1.7  1.70  1.40 12.0
## 74       1 2012 SOUTH     2     TOTAL S2TOTAL 3132   1.98  2.85  2.70 12.0
## 75       1 2012 SOUTH     2     TOTAL S2TOTAL 3133   1.26  1.95  1.75 17.0
## 76       1 2012 SOUTH     2     TOTAL S2TOTAL 3134   1.11  1.95  1.50 10.0
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## 77       1 2012 SOUTH     2     TOTAL S2TOTAL 3135   1.14  1.32  1.05 10.0
## 78       1 2012 SOUTH     2     TOTAL S2TOTAL 3136   1.26  1.60  1.40 10.0
## 79       1 2012 SOUTH     2     TOTAL S2TOTAL 3137    1.3  1.40  0.80 10.0
## 80       1 2012 SOUTH     2     TOTAL S2TOTAL 3138   1.29  1.44  1.35 13.0
## 81       1 2012 SOUTH     2     TOTAL S2TOTAL 3139   1.31  1.35  1.15  7.0
## 82       1 2012 SOUTH     2     TOTAL S2TOTAL 3140   1.15  1.70  1.28 10.0
## 83       1 2012 SOUTH     2     TOTAL S2TOTAL 3151   1.87  3.40  1.85 15.0
## 84       1 2012 SOUTH     2     TOTAL S2TOTAL 3152   1.47  2.10  1.61  8.0
## 85       1 2012 SOUTH     2     TOTAL S2TOTAL 3153   1.05  1.79  1.50 10.0
## 86       1 2012 SOUTH     2     TOTAL S2TOTAL 3154    2.1  4.90  3.75 25.0
## 87       1 2012 SOUTH     2     TOTAL S2TOTAL 3155   1.99  1.80  1.35 13.0
## 88       1 2012 SOUTH     2     TOTAL S2TOTAL 3156   1.42  1.90  1.80 14.0
## 89       1 2012 SOUTH     2     TOTAL S2TOTAL 3157    1.5  2.11  1.75 12.0
## 90       1 2012 SOUTH     2     TOTAL S2TOTAL 3158   1.06  1.05  0.85  4.0
## 91       1 2012 SOUTH     2     TOTAL S2TOTAL 3159   1.49  1.50  1.15 13.0
## 92       1 2012 SOUTH     2     TOTAL S2TOTAL 3160    1.8  1.60  1.50 14.0
## 93       1 2012 SOUTH     2     TOTAL S2TOTAL 3171   1.93  1.74  1.20 14.0
## 94       1 2012 SOUTH     2     TOTAL S2TOTAL 3172    1.2  1.60  1.30 10.0
## 95       1 2012 SOUTH     2     TOTAL S2TOTAL 3173   1.65  1.25  1.10 11.0
## 96       1 2012 SOUTH     2     TOTAL S2TOTAL 3174   1.52  1.49  1.10 12.0
## 97       1 2012 SOUTH     2     TOTAL S2TOTAL 3175   1.43  2.05  1.54 13.0
## 98       1 2012 SOUTH     2     TOTAL S2TOTAL 3176   1.25  1.40  1.25 13.0
## 99       1 2012 SOUTH     2     TOTAL S2TOTAL 3177   1.88  2.65  2.64 20.0
## 100      1 2012 SOUTH     2     TOTAL S2TOTAL 3179   1.03  1.40  0.60 13.0
## 101      1 2012 SOUTH     2     TOTAL S2TOTAL 3180    1.1  1.30  1.20 10.0
## 102      1 2012 SOUTH     2     TOTAL S2TOTAL 3191    1.4  1.05  1.00 10.0
## 103      1 2012 SOUTH     2     TOTAL S2TOTAL 3192   1.05  1.55  0.90 10.0
## 104      1 2012 SOUTH     2     TOTAL S2TOTAL 3193   1.18  1.20  1.00  7.0
## 105      1 2012 SOUTH     2     TOTAL S2TOTAL 3194    1.4  1.30  1.85 13.0
## 106      1 2012 SOUTH     2     TOTAL S2TOTAL 3195   1.37  2.67  2.19 19.0
## 107      1 2012 SOUTH     2     TOTAL S2TOTAL 3196   1.32  2.15  1.55 11.0
## 108      1 2012 SOUTH     2      MEGA  S2MEGA  182   1.55  2.20  1.20 20.0
## 109      1 2012 SOUTH     2      MEGA  S2MEGA  183    1.3  1.80  0.90  8.0
## 110      1 2012 SOUTH     2      MEGA  S2MEGA  184   1.24  1.20  1.20 25.0
## 111      1 2012 SOUTH     2      MEGA  S2MEGA  185    1.5  2.10  1.75 16.0
## 112      1 2012 SOUTH     2      MEGA  S2MEGA  186   1.65  2.50  2.20 15.0
## 113      1 2012 SOUTH     2      MEGA  S2MEGA  187   2.17  2.00  1.20 15.0
## 114      1 2012 SOUTH     2      MEGA  S2MEGA  188   1.28  1.60  1.50 10.0
## 115      1 2012 SOUTH     2      MEGA  S2MEGA  189   1.07  1.50  1.50 10.0
## 116      1 2012 SOUTH     2      MEGA  S2MEGA  190   0.67  1.00  0.80  8.0
## 117      1 2012 SOUTH     2      MEGA  S2MEGA  191   0.68  0.70  0.60  4.0
## 118      1 2012 SOUTH     2      MEGA  S2MEGA  192   1.87  1.60  1.40  9.0
## 119      1 2012 SOUTH     2      MEGA  S2MEGA  193   1.35  1.90  1.50 14.0
## 120      1 2012 SOUTH     2      MEGA  S2MEGA  194   1.75  2.10  2.10 15.0
## 121      1 2012 SOUTH     2      MESO  S2MESO  462   1.75  3.30  2.50 23.0
## 122      1 2012 SOUTH     2      MESO  S2MESO  463   1.64  2.30  2.00 14.0
## 123      1 2012 SOUTH     2      MESO  S2MESO 2138   1.42  0.90  0.80 10.0
## 124      1 2012 SOUTH     3      OPEN  S3OPEN 1301   dead    NA    NA   NA
## 125      1 2012 SOUTH     3      OPEN  S3OPEN 1302    0.9  1.30  1.10 11.0
## 126      1 2012 SOUTH     3     TOTAL S3TOTAL 1061   dead    NA    NA   NA
## 127      1 2012 SOUTH     3     TOTAL S3TOTAL 1062    1.8  2.60  2.60 15.0
## 128      1 2012 SOUTH     3     TOTAL S3TOTAL 1063   2.47  3.10  2.20 18.0
## 129      1 2012 SOUTH     3     TOTAL S3TOTAL 1064   2.15  1.60  1.10 17.0
## 130      1 2012 SOUTH     3     TOTAL S3TOTAL 1066    1.7  2.50  2.15 15.0
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## 131      1 2012 SOUTH     3     TOTAL S3TOTAL 1066    1.9  1.80  1.50 20.0
## 132      1 2012 SOUTH     3     TOTAL S3TOTAL 1067   1.95  2.10  1.90 13.0
## 133      1 2012 SOUTH     3     TOTAL S3TOTAL 1068    1.8  1.70  1.40 13.0
## 134      1 2012 SOUTH     3     TOTAL S3TOTAL 1069    1.4  2.00  1.60 14.0
## 135      1 2012 SOUTH     3     TOTAL S3TOTAL 1070      1  1.30  1.20  7.0
## 136      1 2012 SOUTH     3     TOTAL S3TOTAL 2139   1.75  1.20  1.10 13.0
## 137      1 2012 SOUTH     3     TOTAL S3TOTAL 2140   1.28  1.50  0.95  4.0
## 138      1 2012 SOUTH     3     TOTAL S3TOTAL 2151      1  1.40  1.20  4.0
## 139      1 2012 SOUTH     3     TOTAL S3TOTAL 2152   1.45  1.50  1.30 10.0
## 140      1 2012 SOUTH     3     TOTAL S3TOTAL 2153      1  1.00  0.75  8.0
## 141      1 2012 SOUTH     3     TOTAL S3TOTAL 2154   1.03  1.00  0.90  6.0
## 142      1 2012 SOUTH     3     TOTAL S3TOTAL 2155   1.51  2.00  1.80 12.0
## 143      1 2012 SOUTH     3     TOTAL S3TOTAL 2156   1.17  1.10  0.90 10.0
## 144      1 2012 SOUTH     3     TOTAL S3TOTAL 2157   1.33  1.90  1.85 14.0
## 145      1 2012 SOUTH     3     TOTAL S3TOTAL 2158    1.3  1.10  0.85  8.0
## 146      1 2012 SOUTH     3     TOTAL S3TOTAL 2159   1.13  1.10  0.90 10.0
## 147      1 2012 SOUTH     3     TOTAL S3TOTAL 2160   1.58  1.40  1.40 13.0
## 148      1 2012 SOUTH     3     TOTAL S3TOTAL 2171   1.06  1.40  1.00  5.0
## 149      1 2012 SOUTH     3     TOTAL S3TOTAL 2172   1.05  1.40  0.95  7.0
## 150      1 2012 SOUTH     3     TOTAL S3TOTAL 2173   1.45  1.60  1.10  6.0
## 151      1 2012 SOUTH     3     TOTAL S3TOTAL 2174   1.15  1.10  0.90  5.0
## 152      1 2012 SOUTH     3     TOTAL S3TOTAL 2175   1.42  1.45  1.30 13.0
## 153      1 2012 SOUTH     3     TOTAL S3TOTAL 2176   1.02  1.20  1.00  8.0
## 154      1 2012 SOUTH     3     TOTAL S3TOTAL 2177    1.4  1.20  1.00  9.0
## 155      1 2012 SOUTH     3     TOTAL S3TOTAL 2178   1.45  2.10  2.05 15.0
## 156      1 2012 SOUTH     3      MESO  S3MESO 1421   1.95  2.20  1.60 13.0
## 157      1 2012 SOUTH     3      MESO  S3MESO 1422   dead    NA    NA   NA
##     FLOWERS BUDS FRUITS   ANT
## 1         0    0     10    CS
## 2         0    0    150    TP
## 3         2    1     50    TP
## 4         0    0     75    CS
## 5         0    0     20    CS
## 6         0    0      0     E
## 7         0    0      0    CS
## 8         0    0     25    CS
## 9         0    0      0    TP
## 10        0    0     50    TP
## 11        0    0      5    CS
## 12        0    0     60    TP
## 13        0    0     60    TP
## 14        2    0     60    CS
## 15        2    0      0    CS
## 16        0    0      0    TP
## 17        0    0      0    TP
## 18        0    0      0    CS
## 19        0    0      0    CM
## 20        0    0      0    TP
## 21       NA   NA     NA
## 22        0    0      5    CS
## 23        0    0     45    CS
## 24       40   50     35    CS
## 25        8    2     65    CS
## 26        0    0     20    TP
```

```
## 27        0    0     70    CS
## 28        0    0    125    CM
## 29        0    0    200    CM
## 30        0    0     10    CS
## 31        0    0      0    CS
## 32        0    0     35    TP
## 33        0    0    300    CM
## 34        2    2    100    CS
## 35        0    0     30    CM
## 36        0    0     50    TP
## 37        0    0     10    CM
## 38        0    0     25    CS
## 39        0    0     15    TP
## 40        0    0      0    TP
## 41        0    0     15    TP
## 42        0    0      0    TP
## 43        0    0     40    TP
## 44        0    0      0    TP
## 45        0    0     15    CM
## 46        0    0      0    CM
## 47        0    0      0    TP
## 48        0    0      0    TP
## 49        0    0      1    TP
## 50        0    0     20    TP
## 51        0    0      0    TP
## 52        0    0      0    TP
## 53        0    0     20    TP
## 54        0    0      0    TP
## 55        0    0      0    CN
## 56        0    0      0    CN
## 57        0    0      0    TP
## 58        0    0      5    TP
## 59        0    0      0    TP
## 60        0    0     25    TP
## 61        0    0     25    TP
## 62        0    0     20    TP
## 63        0    0      0    TP
## 64        0    0     10    CS
## 65        1    0     25    CS
## 66        0    0      0    TP
## 67        0    0     10    TP
## 68        0    0      0    TP
## 69        0    0      0    TP
## 70        0    0      0    TP
## 71        0    0      0    TP
## 72        0    0      0    CS
## 73        0    0      0    CS
## 74        0    0     25 AB_TP
## 75        0    0      0    TP
## 76        0    0      0    TP
## 77        0    0      0    TP
## 78        0    0      0    CS
## 79        0    0      0    CS
## 80        0    0      0    CS
```

```
## 81        0    0      0    CS
## 82        0    0      5    CS
## 83        6    0      0    CS
## 84        0    0      0    CS
## 85        0    0      1    CS
## 86        0    0     25    CS
## 87        0    0      0    CS
## 88        0    0      0    CS
## 89        0    0     10    CS
## 90        0    0      0    CS
## 91        0    0     35    CS
## 92        0    0      0    CS
## 93        0    0      0    CS
## 94        0    0      0    CS
## 95        0    0      0    CS
## 96        0    0     20    CS
## 97        0    0      0    CS
## 98        0    0      0    CM
## 99        0    0    100    CM
## 100       0    0      0    CS
## 101       0    0      0    CS
## 102       0    0      0    CS
## 103       0    0      0    CM
## 104       0    0      0    TP
## 105       0    0     30    CS
## 106       0    0     50    TP
## 107       0    0     10    CS
## 108       0    0      0    CS
## 109       0    0     15    CS
## 110       0    0     10    CS
## 111       5    0    200    CS
## 112       0    0     80    CS
## 113       0    0    150    TP
## 114       0    0     40    TP
## 115       0    0     60    TP
## 116       0    0      0    CS
## 117       0    0      0    TP
## 118       0    0     40    CS
## 119       0    0     20    CS
## 120       0    0     75    TP
## 121       0    0     20    CM
## 122       0    0      0    TP
## 123       0    0      0     E
## 124      NA   NA     NA
## 125       0    0      0    TP
## 126      NA   NA     NA
## 127       0    0     50    TP
## 128       0    0      0    TP
## 129       0    0      0    TP
## 130       0    0      2    TP
## 131       0    0     25    TP
## 132       0    0      0    TP
## 133       0    0      0    TP
## 134       0    0      0    TP
```

```
## 135       0    0       0    TP
## 136       0    0       0    TP
## 137       0    0       0    TP
## 138       0    0       0    TP
## 139       0    0       0    TP
## 140       0    0       0    TP
## 141       0    0       0    TP
## 142       0    0       0    TP
## 143       0    0       0    TP
## 144       0    0       0    TP
## 145       0    0       0    TP
## 146       0    0       0    TP
## 147       0    0       0    TP
## 148       0    0       8    TP
## 149       0    0       0    TP
## 150       0    0       0    TP
## 151       0    0       0    TP
## 152       0    0       0    TP
## 153       0    0       0    TP
## 154       0    0       0    TP
## 155       0    0      20    TP
## 156       0    0       2    CS
## 157      NA   NA      NA
```

```
read.csv(file = "../raw-data/ACACIA_DREPANOLOBIUM_SURVEY.txt", sep = "\t")
```

```
##     SURVEY YEAR  SITE BLOCK TREATMENT    PLOT   ID HEIGHT AXIS1 AXIS2 CIRC
## 1        1 2012 SOUTH     1     TOTAL S1TOTAL  581   2.25  2.75  2.15 20.0
## 2        1 2012 SOUTH     1     TOTAL S1TOTAL  582   2.65  4.10  3.90 28.0
## 3        1 2012 SOUTH     1     TOTAL S1TOTAL 3111    1.5  1.70  0.85 17.0
## 4        1 2012 SOUTH     1     TOTAL S1TOTAL 3112   2.01  1.80  1.60 12.0
## 5        1 2012 SOUTH     1     TOTAL S1TOTAL 3113   1.75  1.84  1.42 13.0
## 6        1 2012 SOUTH     1     TOTAL S1TOTAL 3114   1.65  1.62  0.85 15.0
## 7        1 2012 SOUTH     1     TOTAL S1TOTAL 3115    1.2  1.95  0.90  9.0
## 8        1 2012 SOUTH     1     TOTAL S1TOTAL 3199   1.45  2.00  1.75 12.2
## 9        1 2012 SOUTH     1      MESO  S1MESO  941   1.87  2.15  1.82 13.0
## 10       1 2012 SOUTH     1      MESO  S1MESO  942   2.38  5.55  4.82 35.0
## 11       1 2012 SOUTH     1      MESO  S1MESO  943   2.58  4.90  4.24 24.0
## 12       1 2012 SOUTH     1      MESO  S1MESO  944   2.65  3.75  3.10 27.0
## 13       1 2012 SOUTH     1      MESO  S1MESO  946   2.35  2.34  2.05 20.0
## 14       1 2012 SOUTH     1      MESO  S1MESO  947   1.88  2.10  1.85 28.0
## 15       1 2012 SOUTH     1      MESO  S1MESO 3116   2.32  3.05  2.63 30.0
## 16       1 2012 SOUTH     1      MESO  S1MESO 3117   2.39  2.21  2.10 13.0
## 17       1 2012 SOUTH     1      MESO  S1MESO 3118    2.2  1.80  1.50 10.0
## 18       1 2012 SOUTH     1      MESO  S1MESO 3119   1.05  0.90  0.55  8.0
## 19       1 2012 SOUTH     1      MESO  S1MESO 3120      2  1.25  1.20 10.0
## 20       1 2012 SOUTH     1      MESO  S1MESO 3131   1.28  1.14  1.00 10.0
## 21       1 2012 SOUTH     2      OPEN  S2OPEN  341   dead    NA    NA   NA
## 22       1 2012 SOUTH     2     TOTAL S2TOTAL 3178    1.4  2.50  2.15 18.0
## 23       1 2012 SOUTH     2     TOTAL S2TOTAL  101    1.9  3.31  2.65 15.0
## 24       1 2012 SOUTH     2     TOTAL S2TOTAL  102   1.75  2.70  2.55 16.0
## 25       1 2012 SOUTH     2     TOTAL S2TOTAL  103    1.8  2.75  2.30 16.0
## 26       1 2012 SOUTH     2     TOTAL S2TOTAL  104    2.7  4.05  4.00 35.2
## 27       1 2012 SOUTH     2     TOTAL S2TOTAL  105   2.02  2.85  1.49 17.0
```

```
## 28       1 2012 SOUTH     2     TOTAL S2TOTAL  108    1.9  3.10  2.85 19.0
## 29       1 2012 SOUTH     2     TOTAL S2TOTAL  109   1.85  2.45  1.90 19.0
## 30       1 2012 SOUTH     2     TOTAL S2TOTAL  110   1.65  1.90  1.54 17.0
## 31       1 2012 SOUTH     2     TOTAL S2TOTAL  111    1.4  2.35  1.45 14.0
## 32       1 2012 SOUTH     2     TOTAL S2TOTAL  113    2.5  3.25  2.30 22.0
## 33       1 2012 SOUTH     2     TOTAL S2TOTAL  115   2.05  5.40  4.50 33.0
## 34       1 2012 SOUTH     2     TOTAL S2TOTAL  116   2.26  3.50  3.10 33.0
## 35       1 2012 SOUTH     2     TOTAL S2TOTAL  117   2.13  2.40  2.30 20.0
## 36       1 2012 SOUTH     2     TOTAL S2TOTAL  118    1.8  3.15  2.55 22.0
## 37       1 2012 SOUTH     2     TOTAL S2TOTAL 1211   1.85  2.00  2.27 20.0
## 38       1 2012 SOUTH     2     TOTAL S2TOTAL 1212    1.5  2.15  1.80 15.0
## 39       1 2012 SOUTH     2     TOTAL S2TOTAL 1213   1.87  2.34  2.05 13.0
## 40       1 2012 SOUTH     2     TOTAL S2TOTAL 1214   1.58  1.28  0.75 11.0
## 41       1 2012 SOUTH     2     TOTAL S2TOTAL 1215   2.05  2.10  1.75 17.0
## 42       1 2012 SOUTH     2     TOTAL S2TOTAL 1216   1.75  2.45  3.28 16.0
## 43       1 2012 SOUTH     2     TOTAL S2TOTAL 1217   1.49  1.50  1.45 13.0
## 44       1 2012 SOUTH     2     TOTAL S2TOTAL 1218   1.28  2.00  0.90 10.0
## 45       1 2012 SOUTH     2     TOTAL S2TOTAL 1219   1.49  2.35  1.65 13.0
## 46       1 2012 SOUTH     2     TOTAL S2TOTAL 1220   1.07  1.20  0.95 11.0
## 47       1 2012 SOUTH     2     TOTAL S2TOTAL 1231   1.48  1.25  1.20  9.0
## 48       1 2012 SOUTH     2     TOTAL S2TOTAL 1232   1.25  1.25  0.90 10.0
## 49       1 2012 SOUTH     2     TOTAL S2TOTAL 1233   1.41  1.41  1.40 14.0
## 50       1 2012 SOUTH     2     TOTAL S2TOTAL 1234    1.6  1.60  1.30 13.0
## 51       1 2012 SOUTH     2     TOTAL S2TOTAL 1235    1.2  1.20  1.30 14.0
## 52       1 2012 SOUTH     2     TOTAL S2TOTAL 1236   1.49  1.49  1.20  8.0
## 53       1 2012 SOUTH     2     TOTAL S2TOTAL 1237    1.5  1.50  1.50 14.0
## 54       1 2012 SOUTH     2     TOTAL S2TOTAL 1238   1.65  1.65  2.00 20.0
## 55       1 2012 SOUTH     2     TOTAL S2TOTAL 1239   1.13  1.13  1.20 10.0
## 56       1 2012 SOUTH     2     TOTAL S2TOTAL 1240   1.25  1.25  0.90 10.0
## 57       1 2012 SOUTH     2     TOTAL S2TOTAL 1251    1.1  1.20  1.10 10.0
## 58       1 2012 SOUTH     2     TOTAL S2TOTAL 1252    2.2  2.70  2.40 25.0
## 59       1 2012 SOUTH     2     TOTAL S2TOTAL 1253   1.45  1.65  1.25 10.0
## 60       1 2012 SOUTH     2     TOTAL S2TOTAL 1254    1.6  2.45  2.10 13.0
## 61       1 2012 SOUTH     2     TOTAL S2TOTAL 1255   1.55  2.40  1.80 13.0
## 62       1 2012 SOUTH     2     TOTAL S2TOTAL 1256    1.5  2.40  2.15 13.0
## 63       1 2012 SOUTH     2     TOTAL S2TOTAL 1257   1.03  1.20  1.00 10.0
## 64       1 2012 SOUTH     2     TOTAL S2TOTAL 1258   2.14  1.90  1.70 13.0
## 65       1 2012 SOUTH     2     TOTAL S2TOTAL 1259    1.2  1.90  1.65 12.0
## 66       1 2012 SOUTH     2     TOTAL S2TOTAL 1260   1.05  1.10  1.00  9.0
## 67       1 2012 SOUTH     2     TOTAL S2TOTAL 2131    1.8  2.60  2.40 15.0
## 68       1 2012 SOUTH     2     TOTAL S2TOTAL 2132    1.2  1.00  0.95  7.0
## 69       1 2012 SOUTH     2     TOTAL S2TOTAL 2133   1.75  1.40  1.10 10.0
## 70       1 2012 SOUTH     2     TOTAL S2TOTAL 2134   1.45  3.10  1.80 10.0
## 71       1 2012 SOUTH     2     TOTAL S2TOTAL 2135   1.17  1.20  1.10  5.0
## 72       1 2012 SOUTH     2     TOTAL S2TOTAL 2136   2.15  3.10  2.58 22.0
## 73       1 2012 SOUTH     2     TOTAL S2TOTAL 2137    1.7  1.70  1.40 12.0
## 74       1 2012 SOUTH     2     TOTAL S2TOTAL 3132   1.98  2.85  2.70 12.0
## 75       1 2012 SOUTH     2     TOTAL S2TOTAL 3133   1.26  1.95  1.75 17.0
## 76       1 2012 SOUTH     2     TOTAL S2TOTAL 3134   1.11  1.95  1.50 10.0
## 77       1 2012 SOUTH     2     TOTAL S2TOTAL 3135   1.14  1.32  1.05 10.0
## 78       1 2012 SOUTH     2     TOTAL S2TOTAL 3136   1.26  1.60  1.40 10.0
## 79       1 2012 SOUTH     2     TOTAL S2TOTAL 3137    1.3  1.40  0.80 10.0
## 80       1 2012 SOUTH     2     TOTAL S2TOTAL 3138   1.29  1.44  1.35 13.0
## 81       1 2012 SOUTH     2     TOTAL S2TOTAL 3139   1.31  1.35  1.15  7.0
```

```
## 82       1 2012 SOUTH     2     TOTAL S2TOTAL 3140   1.15  1.70  1.28 10.0
## 83       1 2012 SOUTH     2     TOTAL S2TOTAL 3151   1.87  3.40  1.85 15.0
## 84       1 2012 SOUTH     2     TOTAL S2TOTAL 3152   1.47  2.10  1.61  8.0
## 85       1 2012 SOUTH     2     TOTAL S2TOTAL 3153   1.05  1.79  1.50 10.0
## 86       1 2012 SOUTH     2     TOTAL S2TOTAL 3154    2.1  4.90  3.75 25.0
## 87       1 2012 SOUTH     2     TOTAL S2TOTAL 3155   1.99  1.80  1.35 13.0
## 88       1 2012 SOUTH     2     TOTAL S2TOTAL 3156   1.42  1.90  1.80 14.0
## 89       1 2012 SOUTH     2     TOTAL S2TOTAL 3157    1.5  2.11  1.75 12.0
## 90       1 2012 SOUTH     2     TOTAL S2TOTAL 3158   1.06  1.05  0.85  4.0
## 91       1 2012 SOUTH     2     TOTAL S2TOTAL 3159   1.49  1.50  1.15 13.0
## 92       1 2012 SOUTH     2     TOTAL S2TOTAL 3160    1.8  1.60  1.50 14.0
## 93       1 2012 SOUTH     2     TOTAL S2TOTAL 3171   1.93  1.74  1.20 14.0
## 94       1 2012 SOUTH     2     TOTAL S2TOTAL 3172    1.2  1.60  1.30 10.0
## 95       1 2012 SOUTH     2     TOTAL S2TOTAL 3173   1.65  1.25  1.10 11.0
## 96       1 2012 SOUTH     2     TOTAL S2TOTAL 3174   1.52  1.49  1.10 12.0
## 97       1 2012 SOUTH     2     TOTAL S2TOTAL 3175   1.43  2.05  1.54 13.0
## 98       1 2012 SOUTH     2     TOTAL S2TOTAL 3176   1.25  1.40  1.25 13.0
## 99       1 2012 SOUTH     2     TOTAL S2TOTAL 3177   1.88  2.65  2.64 20.0
## 100      1 2012 SOUTH     2     TOTAL S2TOTAL 3179   1.03  1.40  0.60 13.0
## 101      1 2012 SOUTH     2     TOTAL S2TOTAL 3180    1.1  1.30  1.20 10.0
## 102      1 2012 SOUTH     2     TOTAL S2TOTAL 3191    1.4  1.05  1.00 10.0
## 103      1 2012 SOUTH     2     TOTAL S2TOTAL 3192   1.05  1.55  0.90 10.0
## 104      1 2012 SOUTH     2     TOTAL S2TOTAL 3193   1.18  1.20  1.00  7.0
## 105      1 2012 SOUTH     2     TOTAL S2TOTAL 3194    1.4  1.30  1.85 13.0
## 106      1 2012 SOUTH     2     TOTAL S2TOTAL 3195   1.37  2.67  2.19 19.0
## 107      1 2012 SOUTH     2     TOTAL S2TOTAL 3196   1.32  2.15  1.55 11.0
## 108      1 2012 SOUTH     2      MEGA  S2MEGA  182   1.55  2.20  1.20 20.0
## 109      1 2012 SOUTH     2      MEGA  S2MEGA  183    1.3  1.80  0.90  8.0
## 110      1 2012 SOUTH     2      MEGA  S2MEGA  184   1.24  1.20  1.20 25.0
## 111      1 2012 SOUTH     2      MEGA  S2MEGA  185    1.5  2.10  1.75 16.0
## 112      1 2012 SOUTH     2      MEGA  S2MEGA  186   1.65  2.50  2.20 15.0
## 113      1 2012 SOUTH     2      MEGA  S2MEGA  187   2.17  2.00  1.20 15.0
## 114      1 2012 SOUTH     2      MEGA  S2MEGA  188   1.28  1.60  1.50 10.0
## 115      1 2012 SOUTH     2      MEGA  S2MEGA  189   1.07  1.50  1.50 10.0
## 116      1 2012 SOUTH     2      MEGA  S2MEGA  190   0.67  1.00  0.80  8.0
## 117      1 2012 SOUTH     2      MEGA  S2MEGA  191   0.68  0.70  0.60  4.0
## 118      1 2012 SOUTH     2      MEGA  S2MEGA  192   1.87  1.60  1.40  9.0
## 119      1 2012 SOUTH     2      MEGA  S2MEGA  193   1.35  1.90  1.50 14.0
## 120      1 2012 SOUTH     2      MEGA  S2MEGA  194   1.75  2.10  2.10 15.0
## 121      1 2012 SOUTH     2      MESO  S2MESO  462   1.75  3.30  2.50 23.0
## 122      1 2012 SOUTH     2      MESO  S2MESO  463   1.64  2.30  2.00 14.0
## 123      1 2012 SOUTH     2      MESO  S2MESO 2138   1.42  0.90  0.80 10.0
## 124      1 2012 SOUTH     3      OPEN  S3OPEN 1301   dead    NA    NA   NA
## 125      1 2012 SOUTH     3      OPEN  S3OPEN 1302    0.9  1.30  1.10 11.0
## 126      1 2012 SOUTH     3     TOTAL S3TOTAL 1061   dead    NA    NA   NA
## 127      1 2012 SOUTH     3     TOTAL S3TOTAL 1062    1.8  2.60  2.60 15.0
## 128      1 2012 SOUTH     3     TOTAL S3TOTAL 1063   2.47  3.10  2.20 18.0
## 129      1 2012 SOUTH     3     TOTAL S3TOTAL 1064   2.15  1.60  1.10 17.0
## 130      1 2012 SOUTH     3     TOTAL S3TOTAL 1066    1.7  2.50  2.15 15.0
## 131      1 2012 SOUTH     3     TOTAL S3TOTAL 1066    1.9  1.80  1.50 20.0
## 132      1 2012 SOUTH     3     TOTAL S3TOTAL 1067   1.95  2.10  1.90 13.0
## 133      1 2012 SOUTH     3     TOTAL S3TOTAL 1068    1.8  1.70  1.40 13.0
## 134      1 2012 SOUTH     3     TOTAL S3TOTAL 1069    1.4  2.00  1.60 14.0
## 135      1 2012 SOUTH     3     TOTAL S3TOTAL 1070      1  1.30  1.20  7.0
```

```
## 136      1 2012 SOUTH     3     TOTAL S3TOTAL 2139   1.75  1.20  1.10 13.0
## 137      1 2012 SOUTH     3     TOTAL S3TOTAL 2140   1.28  1.50  0.95  4.0
## 138      1 2012 SOUTH     3     TOTAL S3TOTAL 2151      1  1.40  1.20  4.0
## 139      1 2012 SOUTH     3     TOTAL S3TOTAL 2152   1.45  1.50  1.30 10.0
## 140      1 2012 SOUTH     3     TOTAL S3TOTAL 2153      1  1.00  0.75  8.0
## 141      1 2012 SOUTH     3     TOTAL S3TOTAL 2154   1.03  1.00  0.90  6.0
## 142      1 2012 SOUTH     3     TOTAL S3TOTAL 2155   1.51  2.00  1.80 12.0
## 143      1 2012 SOUTH     3     TOTAL S3TOTAL 2156   1.17  1.10  0.90 10.0
## 144      1 2012 SOUTH     3     TOTAL S3TOTAL 2157   1.33  1.90  1.85 14.0
## 145      1 2012 SOUTH     3     TOTAL S3TOTAL 2158    1.3  1.10  0.85  8.0
## 146      1 2012 SOUTH     3     TOTAL S3TOTAL 2159   1.13  1.10  0.90 10.0
## 147      1 2012 SOUTH     3     TOTAL S3TOTAL 2160   1.58  1.40  1.40 13.0
## 148      1 2012 SOUTH     3     TOTAL S3TOTAL 2171   1.06  1.40  1.00  5.0
## 149      1 2012 SOUTH     3     TOTAL S3TOTAL 2172   1.05  1.40  0.95  7.0
## 150      1 2012 SOUTH     3     TOTAL S3TOTAL 2173   1.45  1.60  1.10  6.0
## 151      1 2012 SOUTH     3     TOTAL S3TOTAL 2174   1.15  1.10  0.90  5.0
## 152      1 2012 SOUTH     3     TOTAL S3TOTAL 2175   1.42  1.45  1.30 13.0
## 153      1 2012 SOUTH     3     TOTAL S3TOTAL 2176   1.02  1.20  1.00  8.0
## 154      1 2012 SOUTH     3     TOTAL S3TOTAL 2177    1.4  1.20  1.00  9.0
## 155      1 2012 SOUTH     3     TOTAL S3TOTAL 2178   1.45  2.10  2.05 15.0
## 156      1 2012 SOUTH     3      MESO  S3MESO 1421   1.95  2.20  1.60 13.0
## 157      1 2012 SOUTH     3      MESO  S3MESO 1422   dead    NA    NA   NA
##     FLOWERS BUDS FRUITS   ANT
## 1         0    0     10    CS
## 2         0    0    150    TP
## 3         2    1     50    TP
## 4         0    0     75    CS
## 5         0    0     20    CS
## 6         0    0      0     E
## 7         0    0      0    CS
## 8         0    0     25    CS
## 9         0    0      0    TP
## 10        0    0     50    TP
## 11        0    0      5    CS
## 12        0    0     60    TP
## 13        0    0     60    TP
## 14        2    0     60    CS
## 15        2    0      0    CS
## 16        0    0      0    TP
## 17        0    0      0    TP
## 18        0    0      0    CS
## 19        0    0      0    CM
## 20        0    0      0    TP
## 21       NA   NA     NA
## 22        0    0      5    CS
## 23        0    0     45    CS
## 24       40   50     35    CS
## 25        8    2     65    CS
## 26        0    0     20    TP
## 27        0    0     70    CS
## 28        0    0    125    CM
## 29        0    0    200    CM
## 30        0    0     10    CS
## 31        0    0      0    CS
```

```
## 32        0    0     35    TP
## 33        0    0    300    CM
## 34        2    2    100    CS
## 35        0    0     30    CM
## 36        0    0     50    TP
## 37        0    0     10    CM
## 38        0    0     25    CS
## 39        0    0     15    TP
## 40        0    0      0    TP
## 41        0    0     15    TP
## 42        0    0      0    TP
## 43        0    0     40    TP
## 44        0    0      0    TP
## 45        0    0     15    CM
## 46        0    0      0    CM
## 47        0    0      0    TP
## 48        0    0      0    TP
## 49        0    0      1    TP
## 50        0    0     20    TP
## 51        0    0      0    TP
## 52        0    0      0    TP
## 53        0    0     20    TP
## 54        0    0      0    TP
## 55        0    0      0    CN
## 56        0    0      0    CN
## 57        0    0      0    TP
## 58        0    0      5    TP
## 59        0    0      0    TP
## 60        0    0     25    TP
## 61        0    0     25    TP
## 62        0    0     20    TP
## 63        0    0      0    TP
## 64        0    0     10    CS
## 65        1    0     25    CS
## 66        0    0      0    TP
## 67        0    0     10    TP
## 68        0    0      0    TP
## 69        0    0      0    TP
## 70        0    0      0    TP
## 71        0    0      0    TP
## 72        0    0      0    CS
## 73        0    0      0    CS
## 74        0    0     25 AB_TP
## 75        0    0      0    TP
## 76        0    0      0    TP
## 77        0    0      0    TP
## 78        0    0      0    CS
## 79        0    0      0    CS
## 80        0    0      0    CS
## 81        0    0      0    CS
## 82        0    0      5    CS
## 83        6    0      0    CS
## 84        0    0      0    CS
## 85        0    0      1    CS
```

```
## 86        0    0     25    CS
## 87        0    0      0    CS
## 88        0    0      0    CS
## 89        0    0     10    CS
## 90        0    0      0    CS
## 91        0    0     35    CS
## 92        0    0      0    CS
## 93        0    0      0    CS
## 94        0    0      0    CS
## 95        0    0      0    CS
## 96        0    0     20    CS
## 97        0    0      0    CS
## 98        0    0      0    CM
## 99        0    0    100    CM
## 100       0    0      0    CS
## 101       0    0      0    CS
## 102       0    0      0    CS
## 103       0    0      0    CM
## 104       0    0      0    TP
## 105       0    0     30    CS
## 106       0    0     50    TP
## 107       0    0     10    CS
## 108       0    0      0    CS
## 109       0    0     15    CS
## 110       0    0     10    CS
## 111       5    0    200    CS
## 112       0    0     80    CS
## 113       0    0    150    TP
## 114       0    0     40    TP
## 115       0    0     60    TP
## 116       0    0      0    CS
## 117       0    0      0    TP
## 118       0    0     40    CS
## 119       0    0     20    CS
## 120       0    0     75    TP
## 121       0    0     20    CM
## 122       0    0      0    TP
## 123       0    0      0     E
## 124      NA   NA     NA
## 125       0    0      0    TP
## 126      NA   NA     NA
## 127       0    0     50    TP
## 128       0    0      0    TP
## 129       0    0      0    TP
## 130       0    0      2    TP
## 131       0    0     25    TP
## 132       0    0      0    TP
## 133       0    0      0    TP
## 134       0    0      0    TP
## 135       0    0      0    TP
## 136       0    0      0    TP
## 137       0    0      0    TP
## 138       0    0      0    TP
## 139       0    0      0    TP
```

```
## 140       0    0      0    TP
## 141       0    0      0    TP
## 142       0    0      0    TP
## 143       0    0      0    TP
## 144       0    0      0    TP
## 145       0    0      0    TP
## 146       0    0      0    TP
## 147       0    0      0    TP
## 148       0    0      8    TP
## 149       0    0      0    TP
## 150       0    0      0    TP
## 151       0    0      0    TP
## 152       0    0      0    TP
## 153       0    0      0    TP
## 154       0    0      0    TP
## 155       0    0     20    TP
## 156       0    0      2    CS
## 157      NA   NA     NA
```

```
r_proj_wd <- "/Users/atziri/Bio 195-197/Data Science"
r_chunk_wd <- getwd()
r_proj_wd == r_chunk_wd
```

```
## [1] FALSE
```

```
r_chunk_wd
```

```
## [1] "/Users/atziri/Bio 195-197/Data Science/documents"
```

```
acacia <-read.csv(file = "../raw-data/ACACIA_DREPANOLOBIUM_SURVEY.txt", sep = "\t")
```

#The two dots represents what we need to do to go one up to the folder neded

3. explore our data set

'head()' gives us the first six rows

```
head(acacia)
```

```
##   SURVEY YEAR  SITE BLOCK TREATMENT    PLOT   ID HEIGHT AXIS1 AXIS2 CIRC
## 1      1 2012 SOUTH     1     TOTAL S1TOTAL  581   2.25  2.75  2.15   20
## 2      1 2012 SOUTH     1     TOTAL S1TOTAL  582   2.65  4.10  3.90   28
## 3      1 2012 SOUTH     1     TOTAL S1TOTAL 3111    1.5  1.70  0.85   17
## 4      1 2012 SOUTH     1     TOTAL S1TOTAL 3112   2.01  1.80  1.60   12
## 5      1 2012 SOUTH     1     TOTAL S1TOTAL 3113   1.75  1.84  1.42   13
## 6      1 2012 SOUTH     1     TOTAL S1TOTAL 3114   1.65  1.62  0.85   15
##   FLOWERS BUDS FRUITS ANT
## 1       0    0     10  CS
## 2       0    0    150  TP
## 3       2    1     50  TP
```

```
## 4       0    0     75  CS
## 5       0    0     20  CS
## 6       0    0      0   E
```

```
summary(acacia)
```

```
##      SURVEY       YEAR          SITE               BLOCK
##  Min.   :1   Min.   :2012   Length:157         Min.   :1.000
##  1st Qu.:1   1st Qu.:2012   Class :character   1st Qu.:2.000
##  Median :1   Median :2012   Mode  :character   Median :2.000
##  Mean   :1   Mean   :2012                      Mean   :2.089
##  3rd Qu.:1   3rd Qu.:2012                      3rd Qu.:2.000
##  Max.   :1   Max.   :2012                      Max.   :3.000
##
##   TREATMENT             PLOT                 ID          HEIGHT
##  Length:157         Length:157         Min.   : 101   Length:157
##  Class :character   Class :character   1st Qu.:1062   Class :character
##  Mode  :character   Mode  :character   Median :1301   Mode  :character
##                                        Mean   :1743
##                                        3rd Qu.:3118
##                                        Max.   :3199
##
##      AXIS1           AXIS2            CIRC          FLOWERS
##  Min.   :0.700   Min.   :0.550   Min.   : 4.00   Min.   : 0.0000
##  1st Qu.:1.400   1st Qu.:1.100   1st Qu.:10.00   1st Qu.: 0.0000
##  Median :1.800   Median :1.490   Median :13.00   Median : 0.0000
##  Mean   :1.972   Mean   :1.636   Mean   :13.76   Mean   : 0.4444
##  3rd Qu.:2.350   3rd Qu.:2.000   3rd Qu.:16.00   3rd Qu.: 0.0000
##  Max.   :5.550   Max.   :4.820   Max.   :35.20   Max.   :40.0000
##  NA's   :4       NA's   :4       NA's   :4       NA's   :4
##       BUDS             FRUITS           ANT
##  Min.   : 0.0000   Min.   :  0.00   Length:157
##  1st Qu.: 0.0000   1st Qu.:  0.00   Class :character
##  Median : 0.0000   Median :  0.00   Mode  :character
##  Mean   : 0.3595   Mean   : 20.03
##  3rd Qu.: 0.0000   3rd Qu.: 25.00
##  Max.   :50.0000   Max.   :300.00
##  NA's   :4         NA's   :4
```

```
colnames(acacia)
```

```
##  [1] "SURVEY"    "YEAR"      "SITE"      "BLOCK"     "TREATMENT" "PLOT"
##  [7] "ID"        "HEIGHT"    "AXIS1"     "AXIS2"     "CIRC"      "FLOWERS"
## [13] "BUDS"      "FRUITS"    "ANT"
```

```
row.names(acacia)
```

```
##   [1] "1"   "2"   "3"   "4"   "5"   "6"   "7"   "8"   "9"   "10"  "11"  "12"
##  [13] "13"  "14"  "15"  "16"  "17"  "18"  "19"  "20"  "21"  "22"  "23"  "24"
##  [25] "25"  "26"  "27"  "28"  "29"  "30"  "31"  "32"  "33"  "34"  "35"  "36"
##  [37] "37"  "38"  "39"  "40"  "41"  "42"  "43"  "44"  "45"  "46"  "47"  "48"
##  [49] "49"  "50"  "51"  "52"  "53"  "54"  "55"  "56"  "57"  "58"  "59"  "60"
```

```
##  [61] "61"  "62"  "63"  "64"  "65"  "66"  "67"  "68"  "69"  "70"  "71"  "72"
##  [73] "73"  "74"  "75"  "76"  "77"  "78"  "79"  "80"  "81"  "82"  "83"  "84"
##  [85] "85"  "86"  "87"  "88"  "89"  "90"  "91"  "92"  "93"  "94"  "95"  "96"
##  [97] "97"  "98"  "99"  "100" "101" "102" "103" "104" "105" "106" "107" "108"
## [109] "109" "110" "111" "112" "113" "114" "115" "116" "117" "118" "119" "120"
## [121] "121" "122" "123" "124" "125" "126" "127" "128" "129" "130" "131" "132"
## [133] "133" "134" "135" "136" "137" "138" "139" "140" "141" "142" "143" "144"
## [145] "145" "146" "147" "148" "149" "150" "151" "152" "153" "154" "155" "156"
## [157] "157"
```

```
class(acacia$SURVEY)
```

```
## [1] "integer"
```

```
#the sapplu function all owes to apply a function to a list of objects
#a data frame is a list of vectors of the same lenght
sapply(acacia, class)
```

```
##      SURVEY        YEAR        SITE       BLOCK   TREATMENT        PLOT
##   "integer"   "integer" "character"   "integer" "character" "character"
##          ID      HEIGHT       AXIS1       AXIS2        CIRC     FLOWERS
##   "integer" "character"   "numeric"   "numeric"   "numeric"   "integer"
##        BUDS      FRUITS         ANT
##   "integer"   "integer" "character"
```

make sure that everything htat should be a numeric value is a number one way to check is the 'summary()' command

another way is using the type function

```
typeof(acacia [,"HEIGHT"])
```

```
## [1] "character"
```

```
acacia$HEIGHT
```

```
##   [1] "2.25" "2.65" "1.5"  "2.01" "1.75" "1.65" "1.2"  "1.45" "1.87" "2.38"
##  [11] "2.58" "2.65" "2.35" "1.88" "2.32" "2.39" "2.2"  "1.05" "2"    "1.28"
##  [21] "dead" "1.4"  "1.9"  "1.75" "1.8"  "2.7"  "2.02" "1.9"  "1.85" "1.65"
##  [31] "1.4"  "2.5"  "2.05" "2.26" "2.13" "1.8"  "1.85" "1.5"  "1.87" "1.58"
##  [41] "2.05" "1.75" "1.49" "1.28" "1.49" "1.07" "1.48" "1.25" "1.41" "1.6"
##  [51] "1.2"  "1.49" "1.5"  "1.65" "1.13" "1.25" "1.1"  "2.2"  "1.45" "1.6"
##  [61] "1.55" "1.5"  "1.03" "2.14" "1.2"  "1.05" "1.8"  "1.2"  "1.75" "1.45"
##  [71] "1.17" "2.15" "1.7"  "1.98" "1.26" "1.11" "1.14" "1.26" "1.3"  "1.29"
##  [81] "1.31" "1.15" "1.87" "1.47" "1.05" "2.1"  "1.99" "1.42" "1.5"  "1.06"
##  [91] "1.49" "1.8"  "1.93" "1.2"  "1.65" "1.52" "1.43" "1.25" "1.88" "1.03"
## [101] "1.1"  "1.4"  "1.05" "1.18" "1.4"  "1.37" "1.32" "1.55" "1.3"  "1.24"
## [111] "1.5"  "1.65" "2.17" "1.28" "1.07" "0.67" "0.68" "1.87" "1.35" "1.75"
## [121] "1.75" "1.64" "1.42" "dead" "0.9"  "dead" "1.8"  "2.47" "2.15" "1.7"
## [131] "1.9"  "1.95" "1.8"  "1.4"  "1"    "1.75" "1.28" "1"    "1.45" "1"
## [141] "1.03" "1.51" "1.17" "1.33" "1.3"  "1.13" "1.58" "1.06" "1.05" "1.45"
## [151] "1.15" "1.42" "1.02" "1.4"  "1.45" "1.95" "dead"
```

we identified a column that has problematic data we need to fix this

Cleaning our raw data

3.2 assign 'NA' lable to missing

We are going to read the data table again, but we are going to assign 'NA' to the "dead value"that we dont want in our arguments are always plain text

```
acacia <- read.csv(file = "/Users/atziri/Bio 195-197/Data Science/raw-data/ACACIA_DREPANOLOBIUM_SURVEY.
```

4. Visualize our data

For this we are using the 'ggplot' package. lets install and load it

```
# install.packages("ggplot2")
library(ggplot2)
```

Now We are going to create our first plotting layer with the function 'ggplot.

```
colnames(acacia)
```

```
##  [1] "SURVEY"    "YEAR"      "SITE"      "BLOCK"     "TREATMENT" "PLOT"
##  [7] "ID"        "HEIGHT"    "AXIS1"     "AXIS2"     "CIRC"      "FLOWERS"
## [13] "BUDS"      "FRUITS"    "ANT"
```

```
acacia$CIRC
```

```
##   [1] 20.0 28.0 17.0 12.0 13.0 15.0  9.0 12.2 13.0 35.0 24.0 27.0 20.0 28.0 30.0
##  [16] 13.0 10.0  8.0 10.0 10.0   NA 18.0 15.0 16.0 16.0 35.2 17.0 19.0 19.0 17.0
##  [31] 14.0 22.0 33.0 33.0 20.0 22.0 20.0 15.0 13.0 11.0 17.0 16.0 13.0 10.0 13.0
##  [46] 11.0  9.0 10.0 14.0 13.0 14.0  8.0 14.0 20.0 10.0 10.0 10.0 25.0 10.0 13.0
##  [61] 13.0 13.0 10.0 13.0 12.0  9.0 15.0  7.0 10.0 10.0  5.0 22.0 12.0 12.0 17.0
##  [76] 10.0 10.0 10.0 10.0 13.0  7.0 10.0 15.0  8.0 10.0 25.0 13.0 14.0 12.0  4.0
##  [91] 13.0 14.0 14.0 10.0 11.0 12.0 13.0 13.0 20.0 13.0 10.0 10.0 10.0  7.0 13.0
## [106] 19.0 11.0 20.0  8.0 25.0 16.0 15.0 15.0 10.0 10.0  8.0  4.0  9.0 14.0 15.0
## [121] 23.0 14.0 10.0   NA 11.0   NA 15.0 18.0 17.0 15.0 20.0 13.0 13.0 14.0  7.0
## [136] 13.0  4.0  4.0 10.0  8.0  6.0 12.0 10.0 14.0  8.0 10.0 13.0  5.0  7.0  6.0
## [151]  5.0 13.0  8.0  9.0 15.0 13.0   NA
```

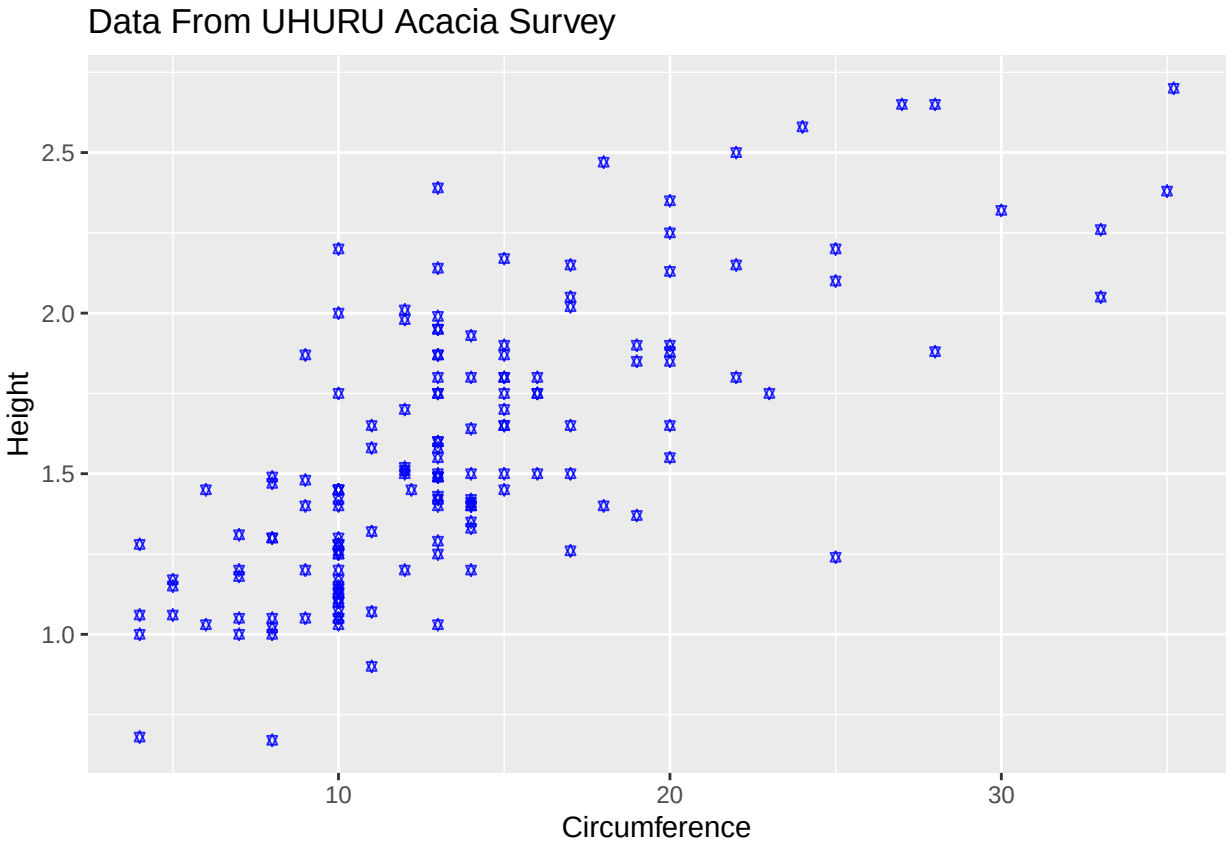
The ggplot function creates a blank canvas. the canvas contains our data and the variables that we plot.

The aes function allows for the plugging of all lines colors and data we want to read

A scatter plot can be created with the function (geom_point) it can have a blank () however if you want to specidy color sixe and trasparency you add it

```
ggplot(data = acacia, mapping = aes(x = CIRC, y = HEIGHT )) + geom_point(size = 1, color = "blue", alpha
  labs(x = "Circumference", y = "Height", title = "Data From UHURU Acacia Survey ")
```

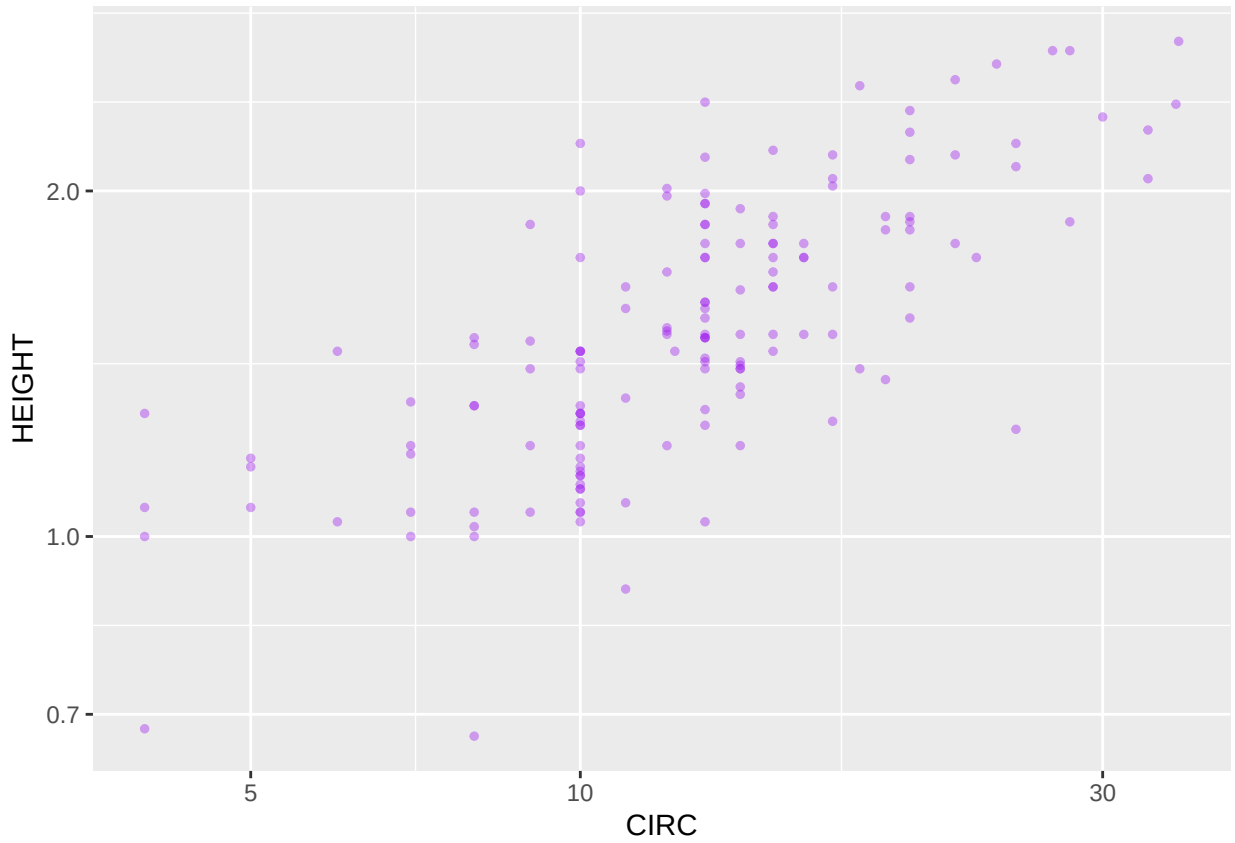
```
## Warning: Removed 4 rows containing missing values (geom_point).
```



to rescale th eplotting of the axis to log scale we use the function 'scale_y_log_10()'

```
ggplot(data = acacia, mapping = aes(x = CIRC, y = HEIGHT )) +
  geom_point(size = 1, color = "purple", alpha = 0.4) +
  scale_x_log10() +
  scale_y_log10()
```

```
## Warning: Removed 4 rows containing missing values (geom_point).
```

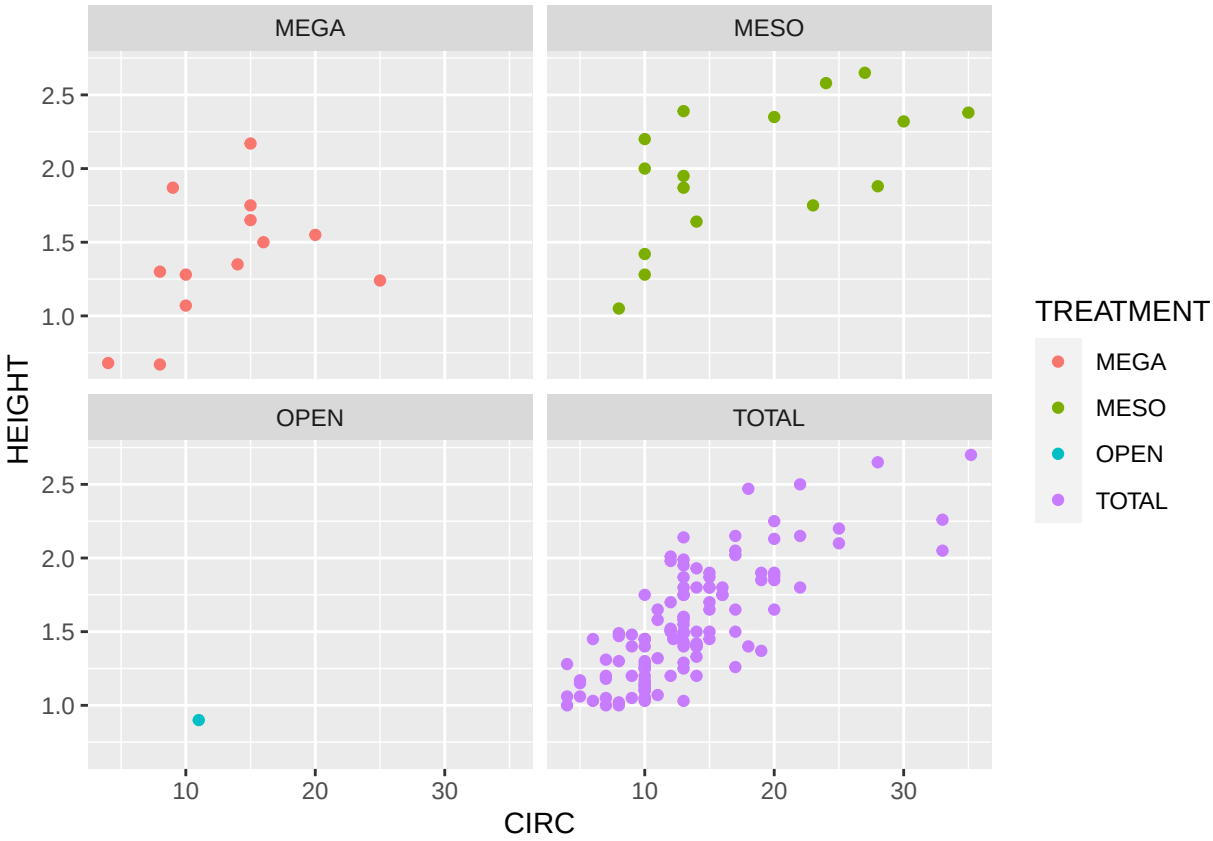



```
acacia$TREATMENT
```

```
##   [1] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "MESO"
##  [10] "MESO"  "MESO"  "MESO"  "MESO"  "MESO"  "MESO"  "MESO"  "MESO"  "MESO"
##  [19] "MESO"  "MESO"  "OPEN"  "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
##  [28] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
##  [37] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
##  [46] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
##  [55] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
##  [64] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
##  [73] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
##  [82] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
##  [91] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
## [100] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "MEGA"
## [109] "MEGA"  "MEGA"  "MEGA"  "MEGA"  "MEGA"  "MEGA"  "MEGA"  "MEGA"  "MEGA"
## [118] "MEGA"  "MEGA"  "MEGA"  "MESO"  "MESO"  "MESO"  "OPEN"  "OPEN"  "TOTAL"
## [127] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
## [136] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
## [145] "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL" "TOTAL"
## [154] "TOTAL" "TOTAL" "MESO"  "MESO"
```

```
ggplot(data = acacia, mapping = aes (x = CIRC, y = HEIGHT, color = TREATMENT)) +
 geom_point() +
  facet_wrap(~TREATMENT)
```

```
## Warning: Removed 4 rows containing missing values (geom_point).
```



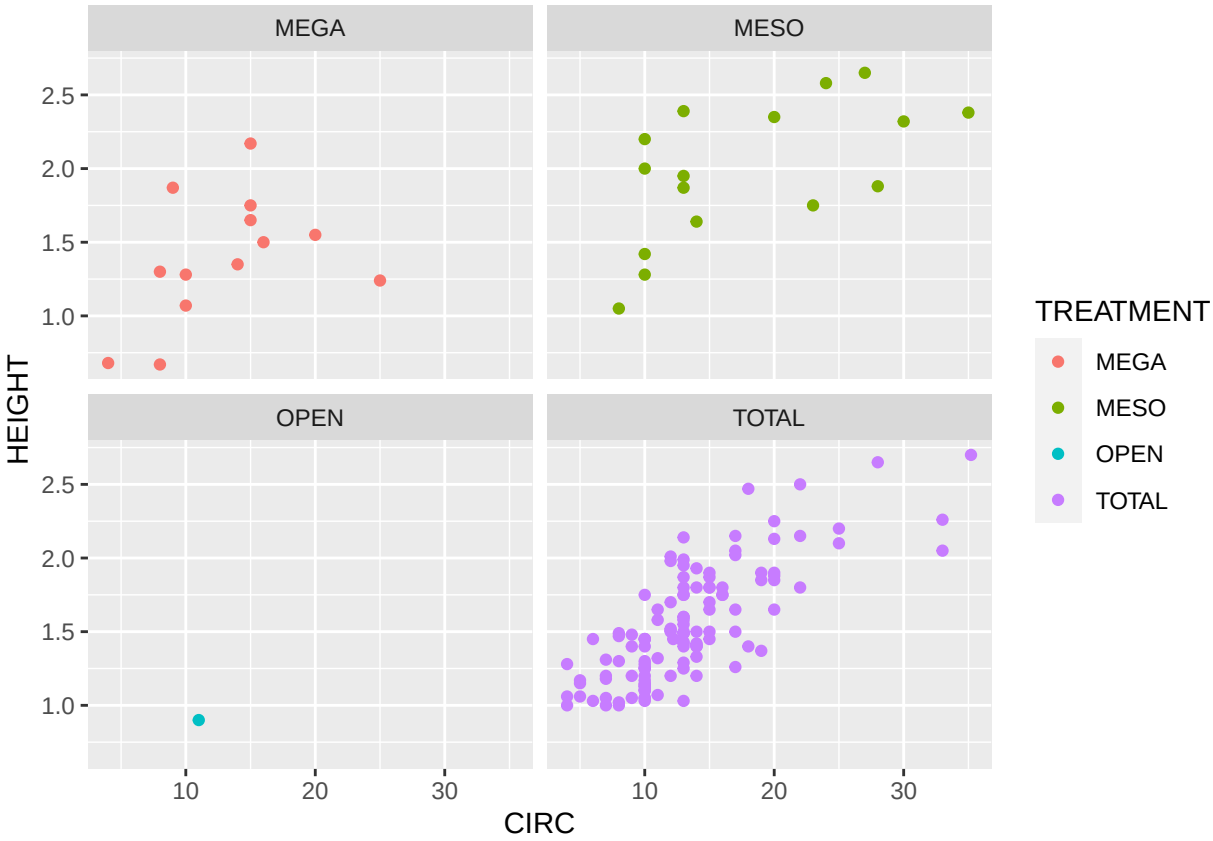
4.2 Visualize a statystical analysis of correlation

Subplots or facets

Teh function ro create subplots by a third variablr is called 'facet_wrap()'

```
ggplot(data = acacia, mapping = aes(x = CIRC, y = HEIGHT, color = TREATMENT)) + geom_point() +
  facet_wrap(~TREATMENT)
```

```
## Warning: Removed 4 rows containing missing values (geom_point).
```



The total that excludes all the herbivores has more trees than the fenced spaces with select herbivores meso has taller trees with larger circumference mega has shorter trees with smaller circumference

A little interpretation of what is going on here

How to test a Hypothesis

Model Filling functions

The geom_smooth() function

```
ggplot(data = acacia, mapping = aes(x = CIRC, y = HEIGHT, color = TREATMENT, linetype  = TREATMENT)) + g
 geom_smooth(methood = "loess") +
  facet_wrap(~TREATMENT)
```

```
## Warning: Ignoring unknown parameters: methood
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```

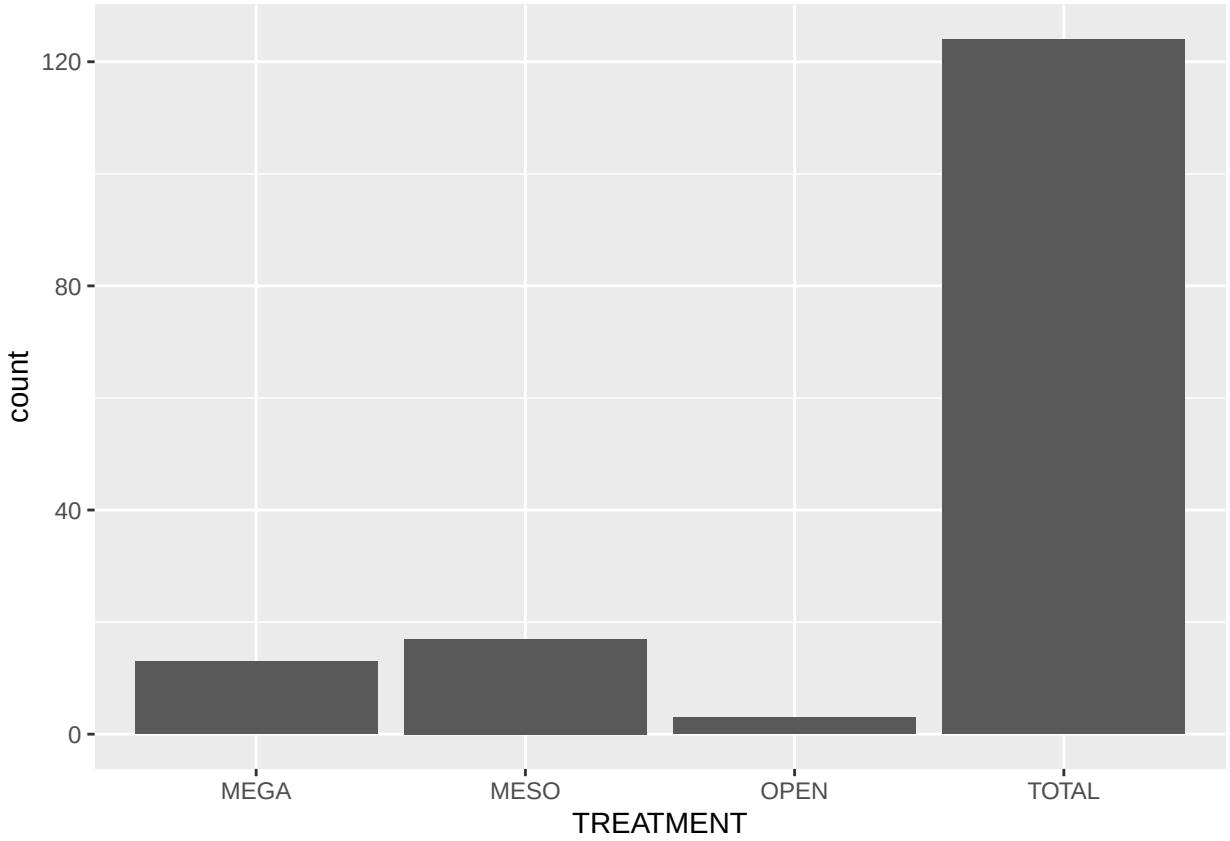
```
## Warning: Removed 4 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 4 rows containing missing values (geom_point).
```

Histograms and barplots

For bar plots use the geom_bar() function:

```
ggplot(data = acacia, aes(x = TREATMENT))+
  geom_bar()
```

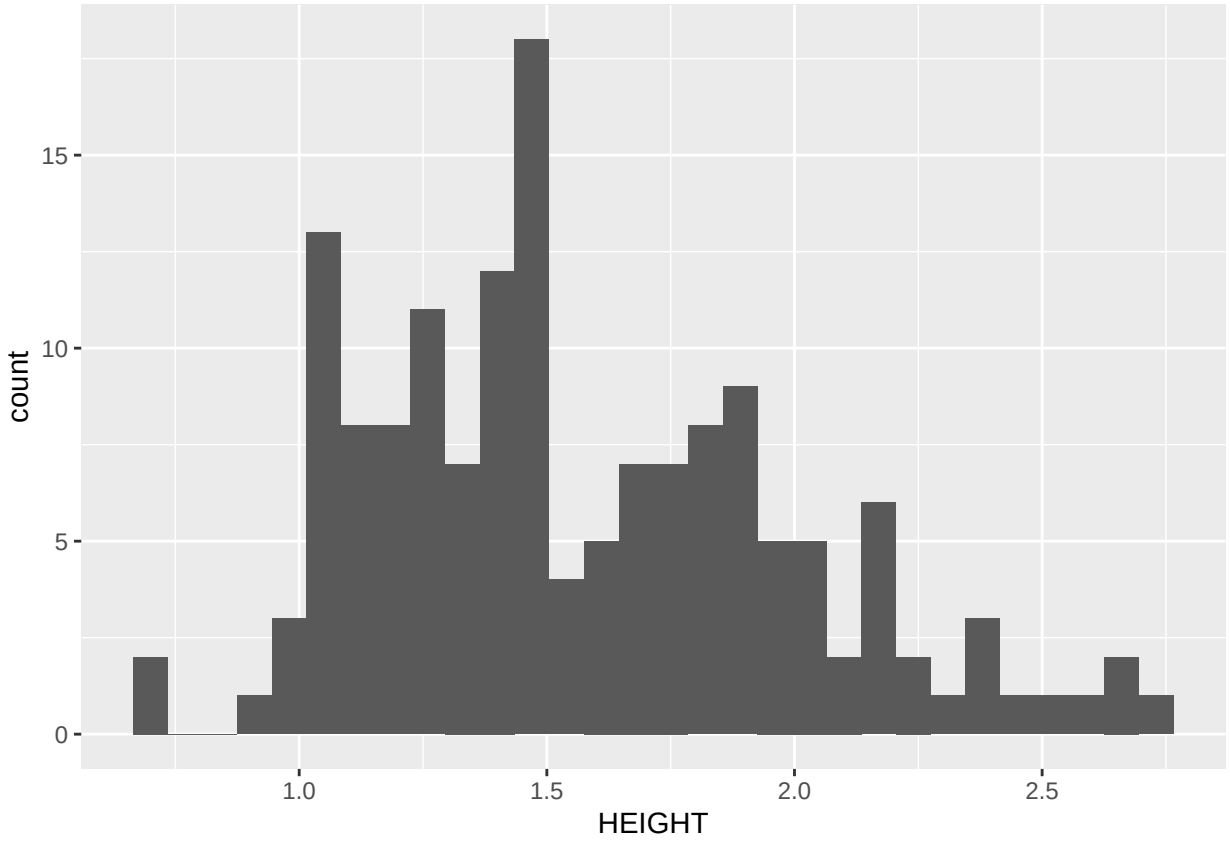


If you want to see the distribution of a continuous variable we use the geom_ histogram() function:

```
ggplot(data = acacia, mapping = aes(x = HEIGHT)) +
  geom_histogram()
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

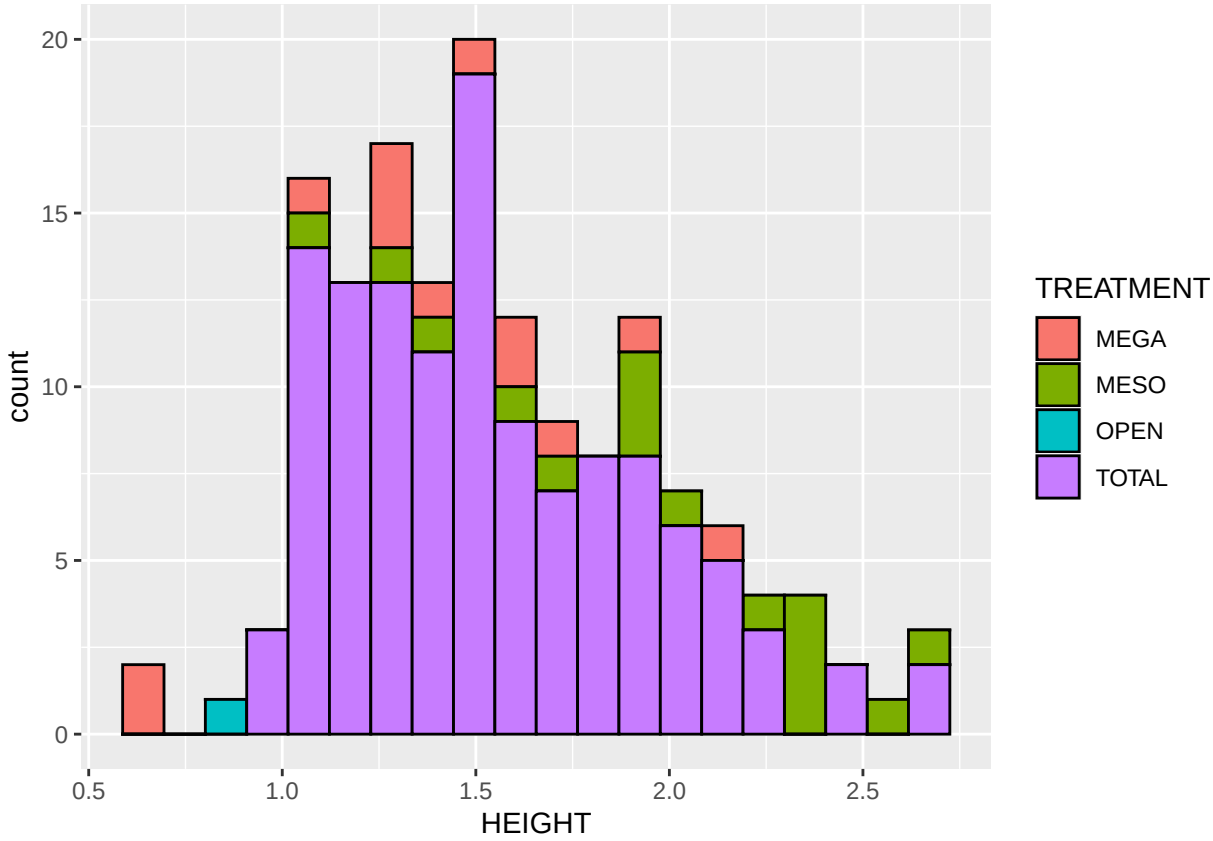
```
## Warning: Removed 4 rows containing non-finite values (stat_bin).
```



The 'fill =' command gives the inside of the bar color and the 'color = " "' command gives the outline color of the bars

```
ggplot(data = acacia, mapping = aes(x = HEIGHT, fill = TREATMENT)) +
  geom_histogram(bins = 20, color = "black")
```

```
## Warning: Removed 4 rows containing non-finite values (stat_bin).
```



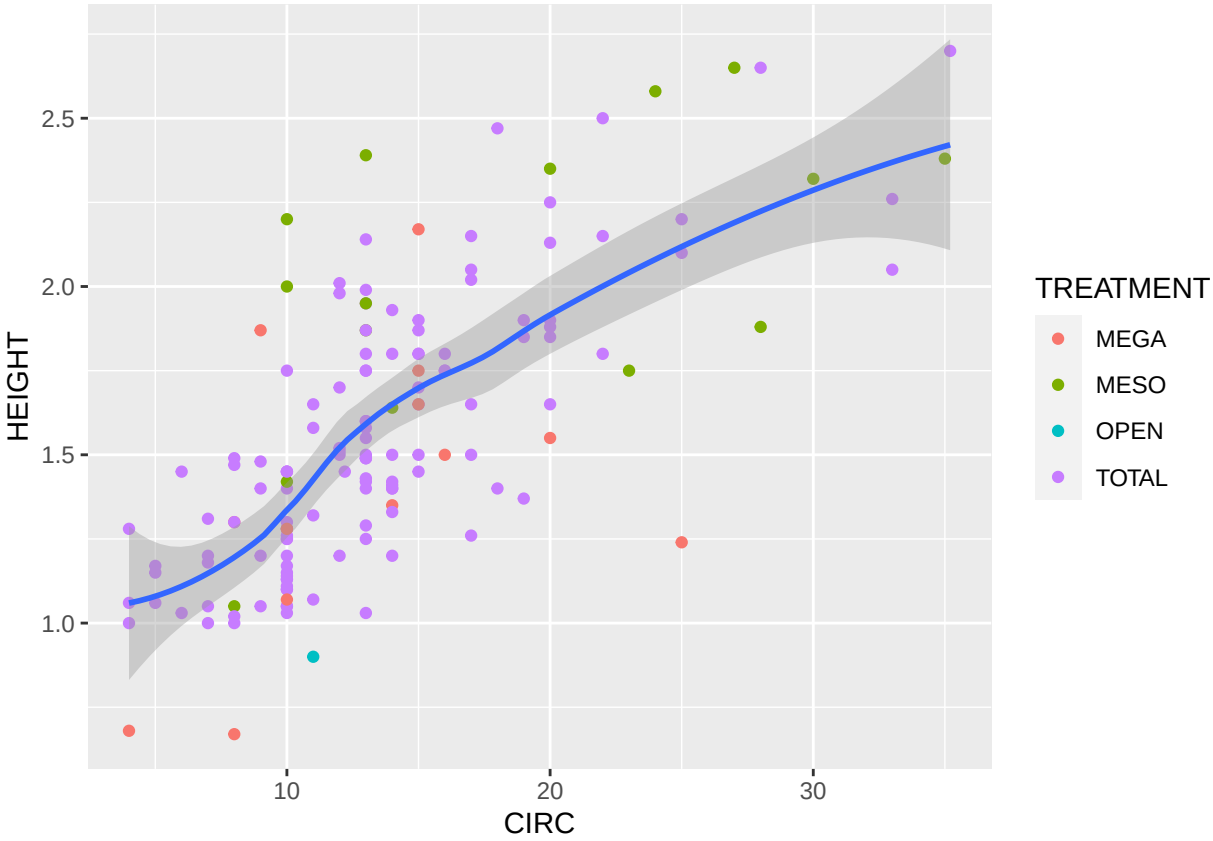
layer multiple data from the same or different data sets

```
ggplot() +
  geom_point(data = acacia,
             mapping = aes(x = CIRC, y = HEIGHT,
                           color = TREATMENT)) +
  geom_smooth(data = acacia,
              mapping = aes(x = CIRC, y = HEIGHT))
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'

## Warning: Removed 4 rows containing non-finite values (stat_smooth).

## Warning: Removed 4 rows containing missing values (geom_point).
```



Save images as files

```
ggsave(filename = "acacia_by_treatment.pdf")
```

```
## Saving 6.5 x 4.5 in image
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```

```
## Warning: Removed 4 rows containing non-finite values (stat_smooth).
```

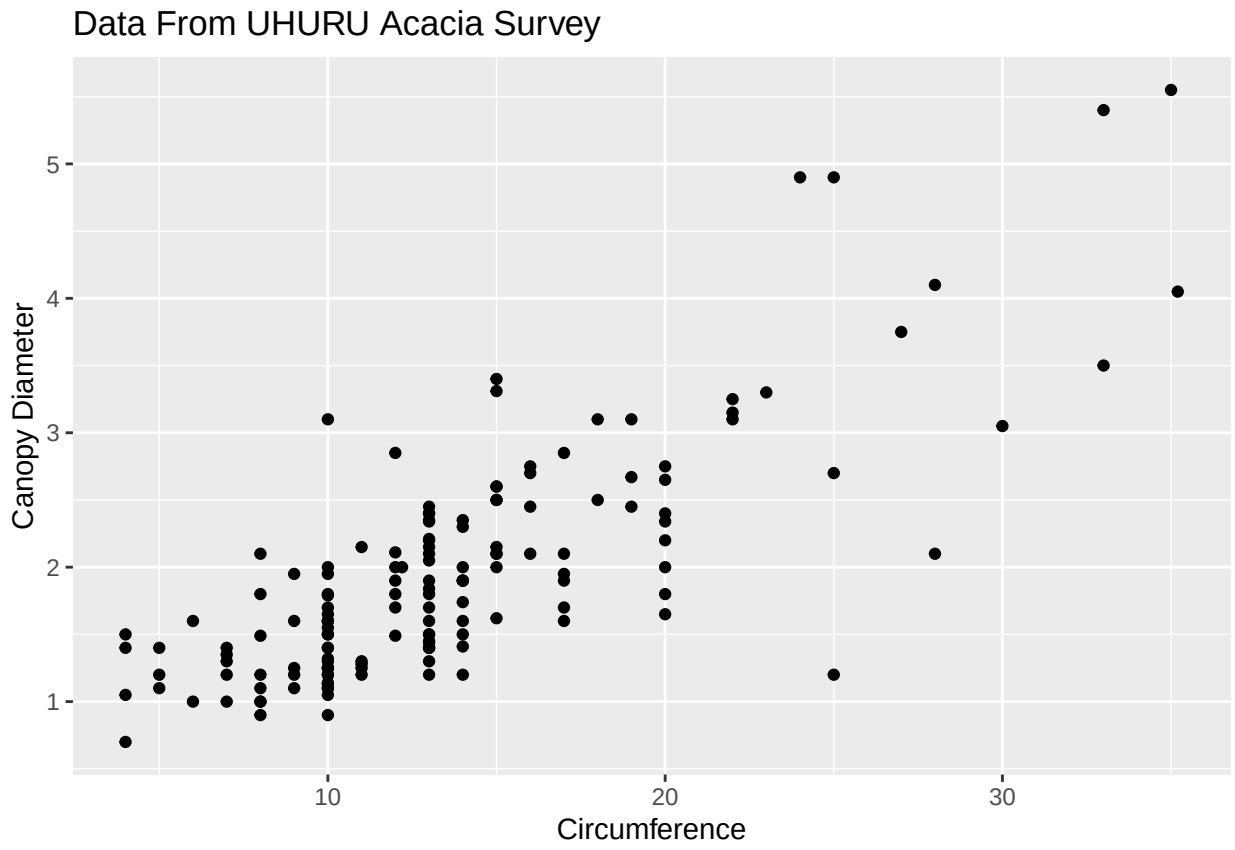
```
## Warning: Removed 4 rows containing missing values (geom_point).
```

In class exercise 1.

1.

```
ggplot() +
  geom_point(data = acacia,
             mapping = aes(x = CIRC, y = AXIS1, )) +
  labs(x = "Circumference", y =  "Canopy Diameter", title = "Data From UHURU Acacia Survey ")
```

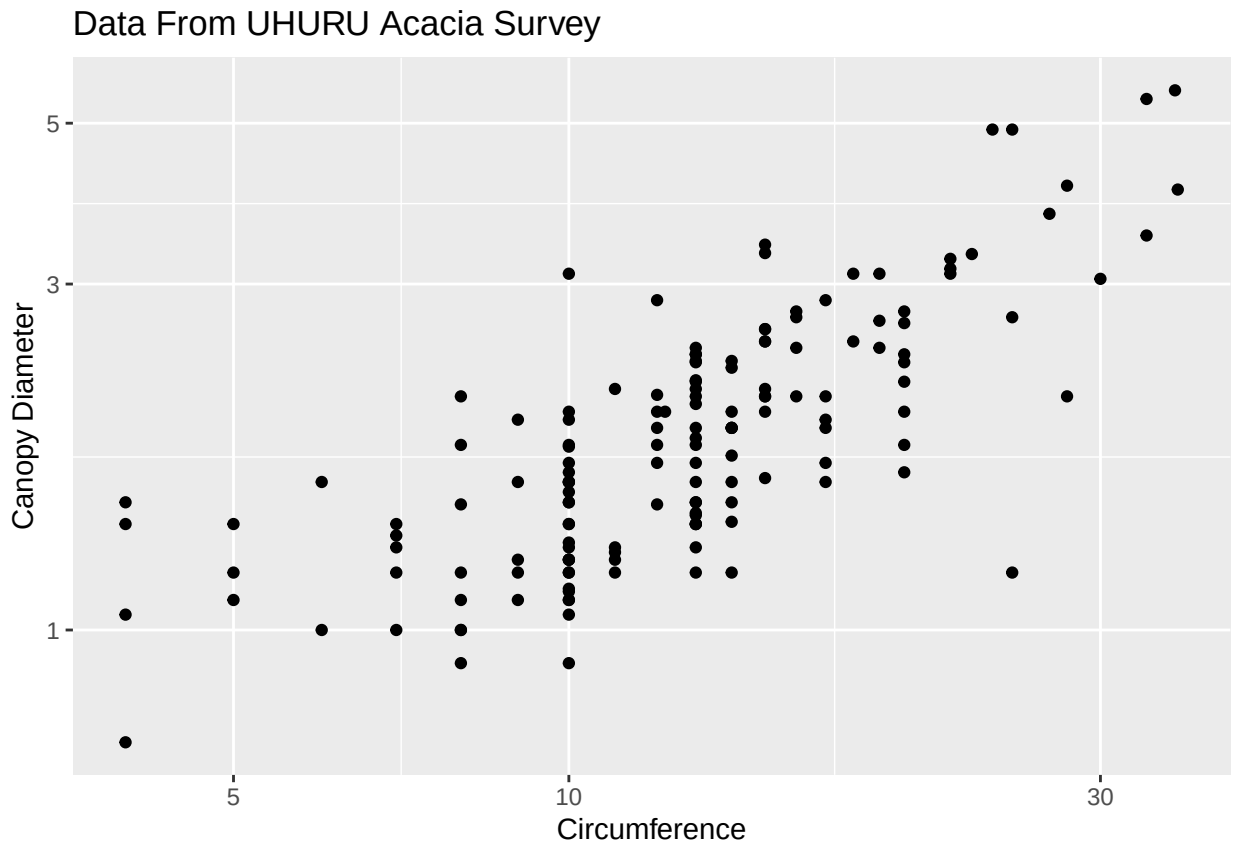
```
## Warning: Removed 4 rows containing missing values (geom_point).
```



2.

```
ggplot() +
  geom_point(data = acacia,
             mapping = aes(x = CIRC, y = AXIS1, )) +
  labs(x = "Circumference", y =  "Canopy Diameter", title = "Data From UHURU Acacia Survey ") +
  scale_x_log10() +
  scale_y_log10()
```

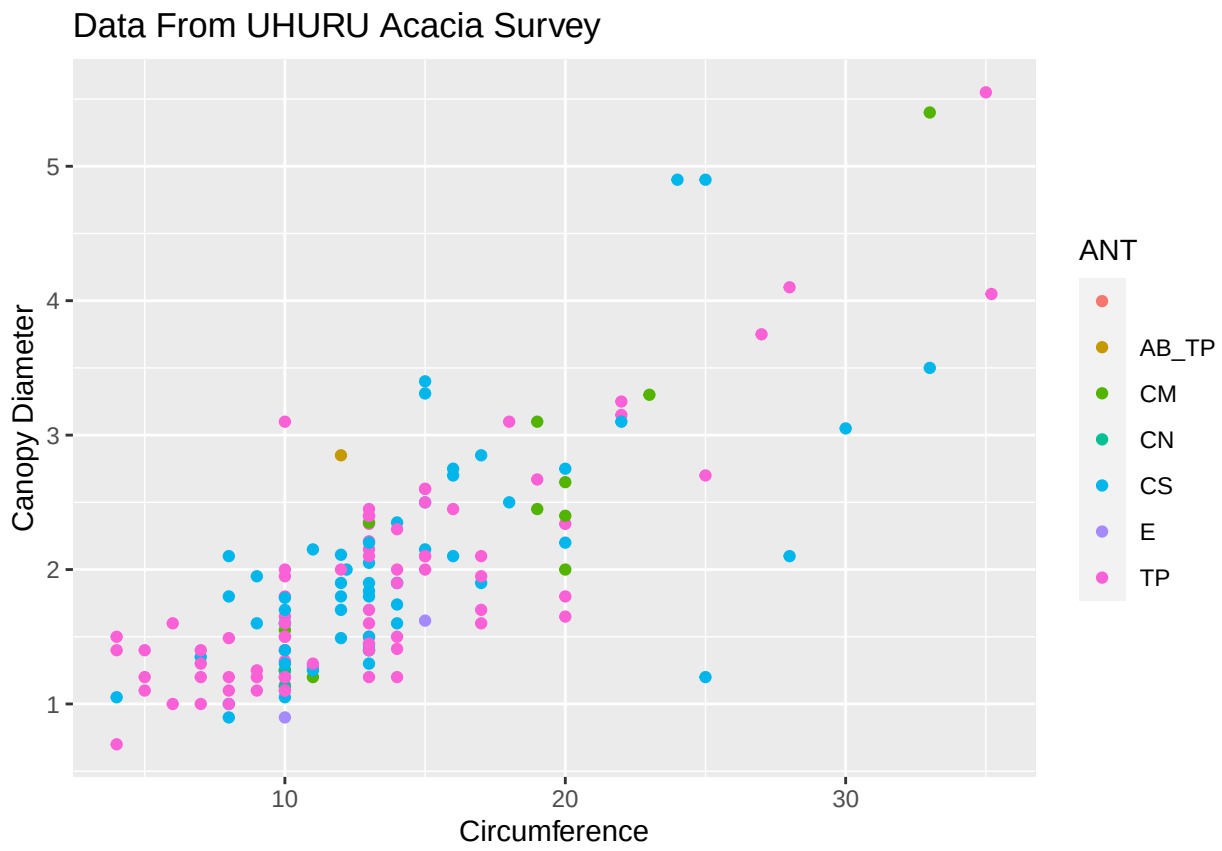
```
## Warning: Removed 4 rows containing missing values (geom_point).
```



3.

```
ggplot() +
  geom_point(data = acacia,
             mapping = aes(x = CIRC, y = AXIS1,
                           color = ANT)) +
  labs(x = "Circumference", y =  "Canopy Diameter", title = "Data From UHURU Acacia Survey ")
```

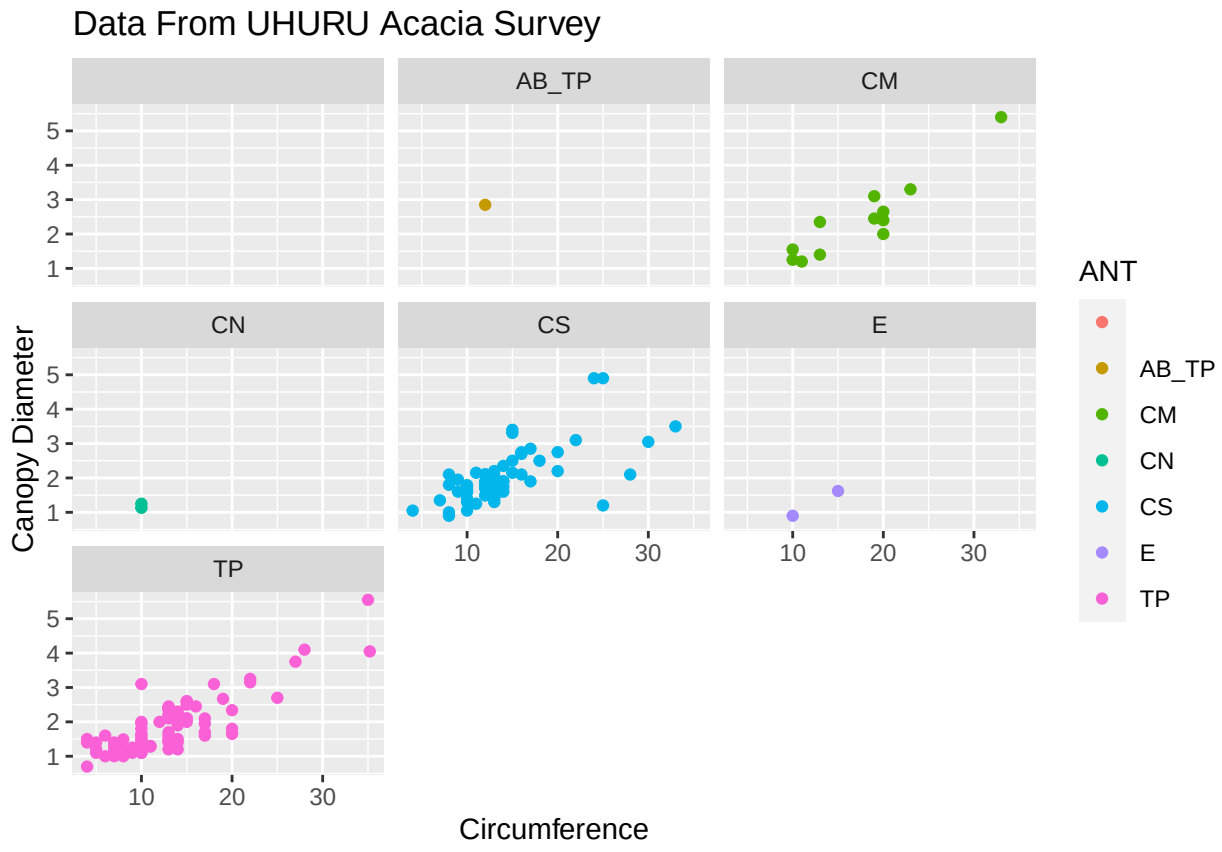
```
## Warning: Removed 4 rows containing missing values (geom_point).
```



4.

```
ggplot() +
  geom_point(data = acacia,
             mapping = aes(x = CIRC, y = AXIS1,
                           color = ANT)) +
  labs(x = "Circumference", y =  "Canopy Diameter", title = "Data From UHURU Acacia Survey ") +
geom_point() +
  facet_wrap(~ANT)
```

```
## Warning: Removed 4 rows containing missing values (geom_point).
```



5.

```
ggplot(data = acacia,
             mapping = aes(x = CIRC, y = AXIS1,
                           color = ANT)) +
  labs(x = "Circumference", y =  "Canopy Diameter", title = "Data From UHURU Acacia Survey ") +
geom_point() +
  geom_smooth()+
  facet_wrap(~ANT)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'

## Warning: Removed 4 rows containing non-finite values (stat_smooth).

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : span too small. fewer data values than degrees of freedom.

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : at 9.975

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : radius 0.000625

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : all data on boundary of neighborhood. make span bigger
```

```
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : pseudoinverse used at 9.975

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : neighborhood radius 0.025

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : reciprocal condition number 1

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : at 15.025

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : radius 0.000625

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : all data on boundary of neighborhood. make span bigger

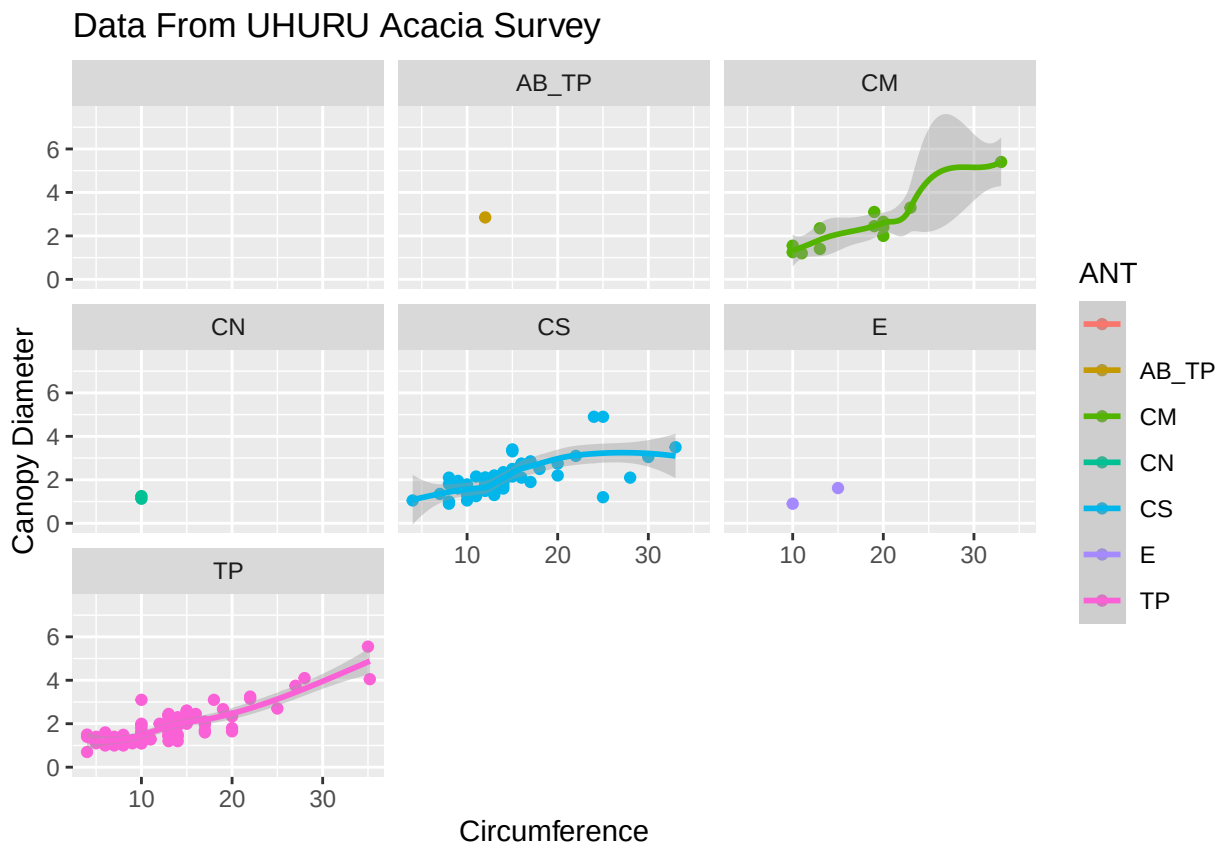
## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : There are other near singularities as well. 0.000625

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : zero-width neighborhood. make span bigger

## Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : zero-width neighborhood. make span bigger

## Warning: Computation failed in `stat_smooth()`:
## NA/NaN/Inf in foreign function call (arg 5)

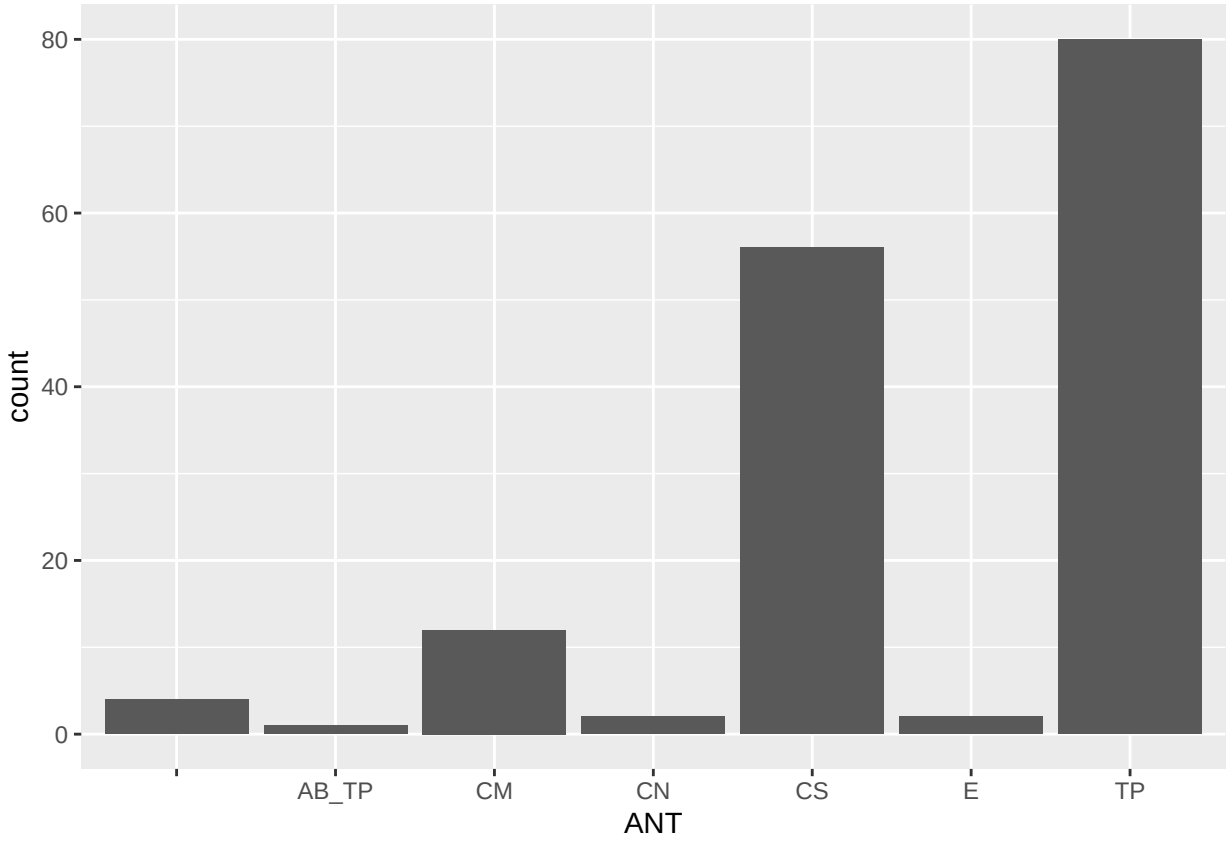
## Warning: Removed 4 rows containing missing values (geom_point).
```



#Exercise 2. Histograms

1.

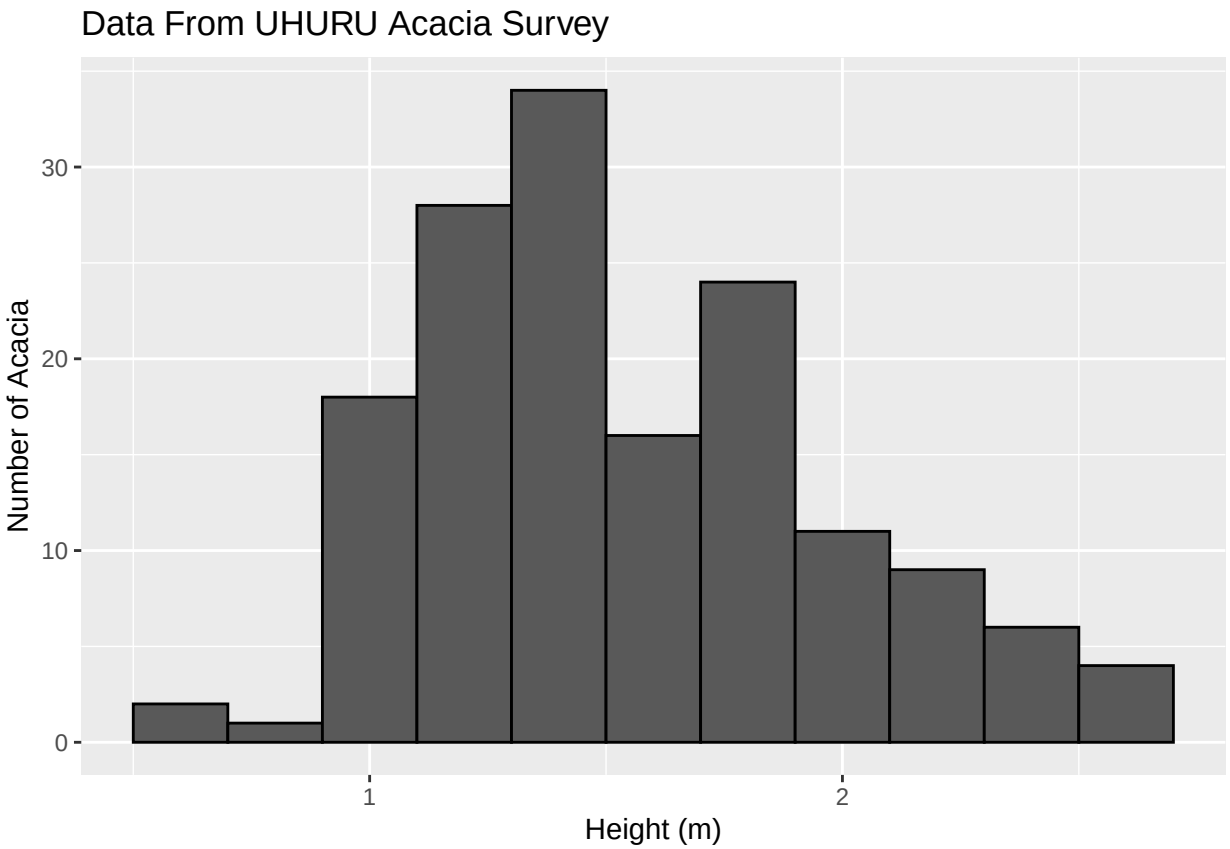
```
ggplot(data = acacia, aes(x = ANT))+
  geom_bar()
```



2.

```
ggplot(data = acacia, mapping = aes(x = HEIGHT)) +
   labs(x = "Height (m)", y =  "Number of Acacia", title = "Data From UHURU Acacia Survey ") +
  geom_histogram(binwidth = .20 , color = "black")
```

```
## Warning: Removed 4 rows containing non-finite values (stat_bin).
```



3.

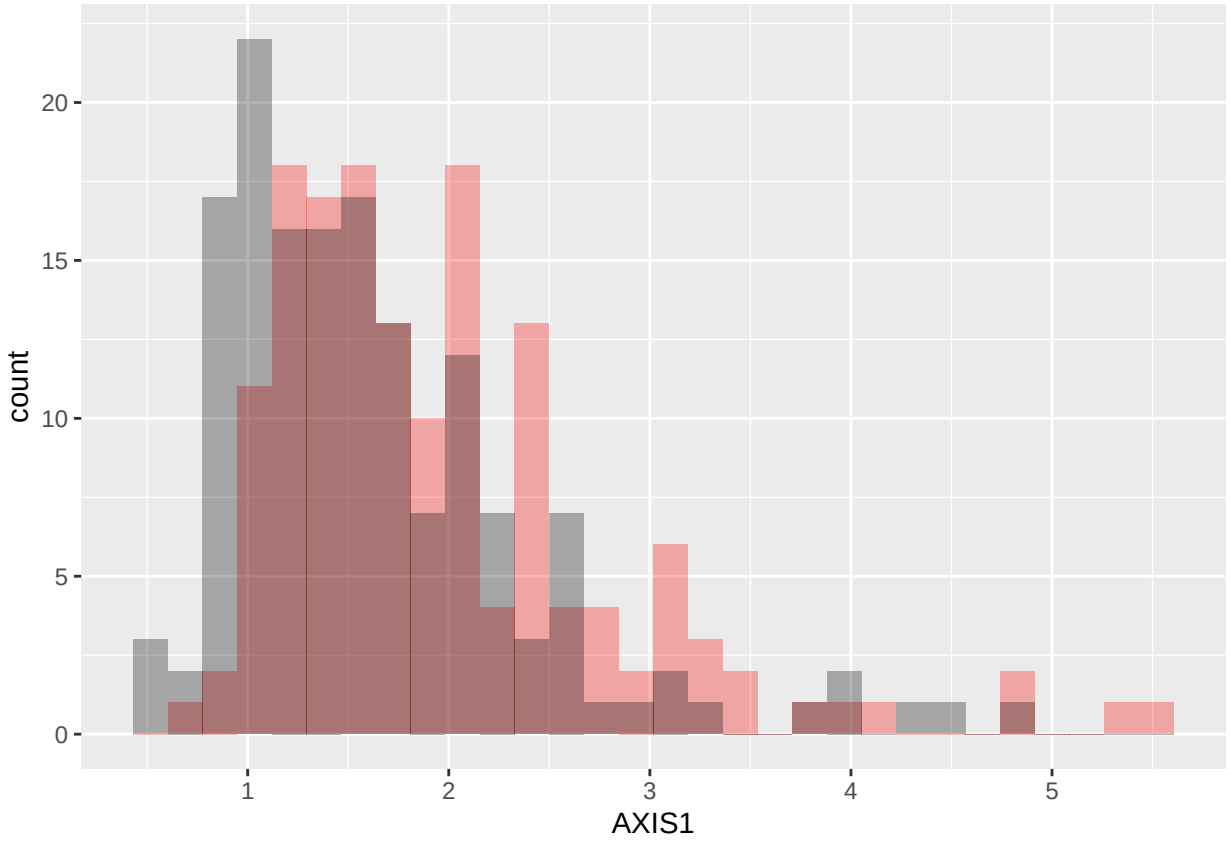
```
ggplot() +
  geom_histogram(data = acacia,
             mapping = aes(x = AXIS1) , alpha = 0.3, fill = "red") +
  geom_histogram(data = acacia,
              mapping = aes(x = AXIS2), alpha = 0.3, fill = "black")
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

```
## Warning: Removed 4 rows containing non-finite values (stat_bin).
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

```
## Warning: Removed 4 rows containing non-finite values (stat_bin).
```



4.

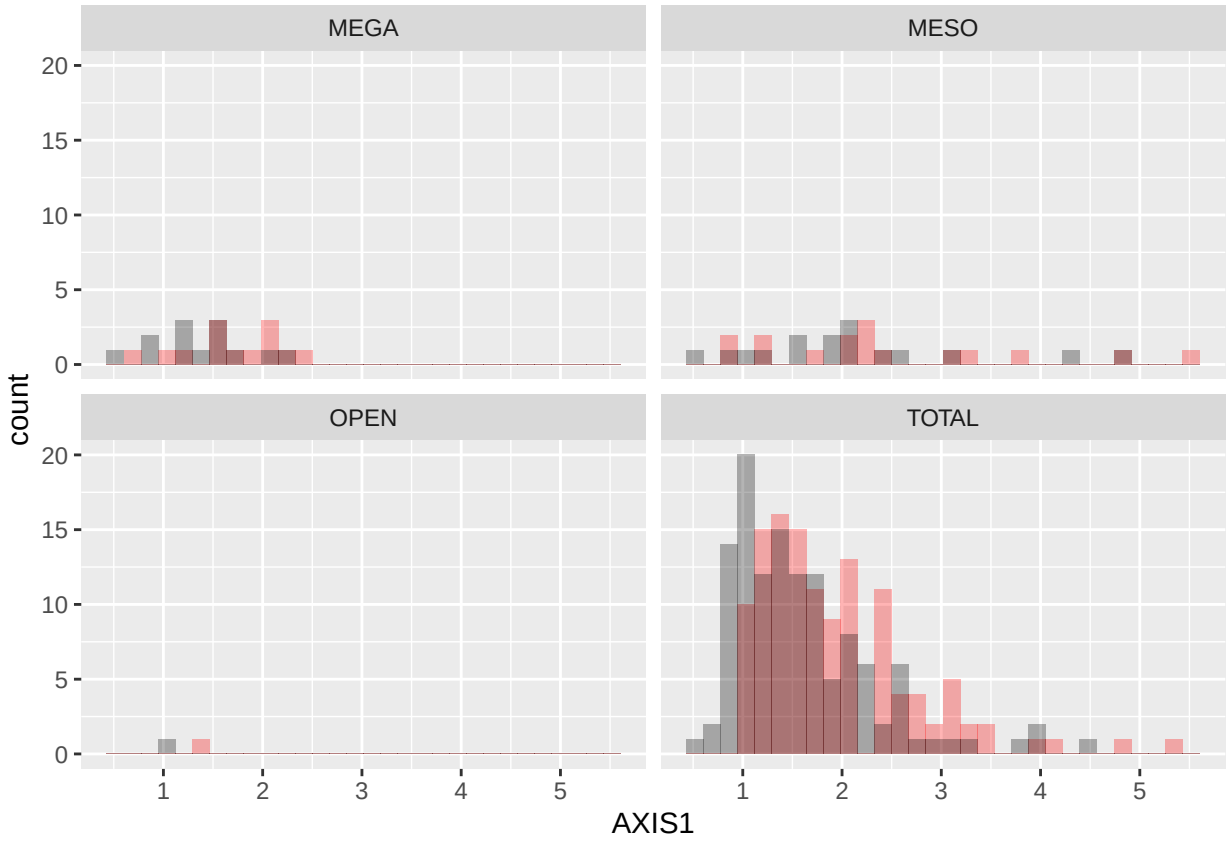
```
ggplot() +
  geom_histogram(data = acacia,
             mapping = aes(x = AXIS1) , alpha = 0.3, fill = "red") +
  geom_histogram(data = acacia,
              mapping = aes(x = AXIS2), alpha = 0.3, fill = "black") +
  facet_wrap(~ TREATMENT)
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.

## Warning: Removed 4 rows containing non-finite values (stat_bin).

## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.

## Warning: Removed 4 rows containing non-finite values (stat_bin).
```



Home exercises

Exercised 3.

#1 To installed a package use the function 'install.packages(" ")'

```
#install.packages("readr")
```

function library allows me to open the directory where the package i just downloaded is stored

```
library(readr)
```

getting and setting my working directory

```
setwd("~/Bio 195-197/Data Science/raw-data")
getwd()
```

```
## [1] "/Users/atziri/Bio 195-197/Data Science/raw-data"
```

```
read_tsv(file = "/Users/atziri/Bio 195-197/Data Science/raw-data/TREE_SURVEYS.txt")
```

```
## Rows: 7508 Columns: 16-- Column specification --------------------------------------------------------
```

```
## Delimiter: "\t"
## chr (9): SITE, TREATMENT, PLOT, SPECIES, DEAD, HEIGHT, AXIS_2, MEASUREMENT, ...
## dbl (7): SURVEY, YEAR, BLOCK, ORIGINAL_TAG, NEW_TAG, AXIS_1, CIRC
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.

## # A tibble: 7,508 x 16
##    SURVEY  YEAR SITE  TREATMENT BLOCK PLOT  SPECIES ORIGI~1 NEW_TAG DEAD  HEIGHT
##     <dbl> <dbl> <chr> <chr>     <dbl> <chr> <chr>     <dbl>   <dbl> <chr> <chr>
##  1      1  2009 SOUTH TOTAL         2 S2TO~ Acacia~       1      NA N     3.4
##  2      2  2010 SOUTH TOTAL         2 S2TO~ Acacia~       1      NA N     3.32
##  3      3  2011 SOUTH TOTAL         2 S2TO~ Acacia~       1      NA N     3.65
##  4      4  2012 SOUTH TOTAL         2 S2TO~ Acacia~       1      NA N     3.74
##  5      5  2013 SOUTH TOTAL         2 S2TO~ Acacia~       1      NA N     3.59
##  6      1  2009 SOUTH TOTAL         2 S2TO~ Acacia~       2      NA N     2.3
##  7      2  2010 SOUTH TOTAL         2 S2TO~ Acacia~       2      NA N     2.32
##  8      3  2011 SOUTH TOTAL         2 S2TO~ Acacia~       2      NA N     2.75
##  9      4  2012 SOUTH TOTAL         2 S2TO~ Acacia~       2      NA Y     <NA>
## 10      5  2013 SOUTH TOTAL         2 S2TO~ Acacia~       2      NA N     2.86
## # ... with 7,498 more rows, 5 more variables: AXIS_1 <dbl>, AXIS_2 <chr>,
## #   CIRC <dbl>, MEASUREMENT <chr>, STEMS <chr>, and abbreviated variable name
## #   1: ORIGINAL_TAG
```

```
read_tsv(file = "../raw-data/TREE_SURVEYS.txt")
```

```
## Rows: 7508 Columns: 16-- Column specification --------------------------------------------------------
## Delimiter: "\t"
## chr (9): SITE, TREATMENT, PLOT, SPECIES, DEAD, HEIGHT, AXIS_2, MEASUREMENT, ...
## dbl (7): SURVEY, YEAR, BLOCK, ORIGINAL_TAG, NEW_TAG, AXIS_1, CIRC
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.

## # A tibble: 7,508 x 16
##    SURVEY  YEAR SITE  TREATMENT BLOCK PLOT  SPECIES ORIGI~1 NEW_TAG DEAD  HEIGHT
##     <dbl> <dbl> <chr> <chr>     <dbl> <chr> <chr>     <dbl>   <dbl> <chr> <chr>
##  1      1  2009 SOUTH TOTAL         2 S2TO~ Acacia~       1      NA N     3.4
##  2      2  2010 SOUTH TOTAL         2 S2TO~ Acacia~       1      NA N     3.32
##  3      3  2011 SOUTH TOTAL         2 S2TO~ Acacia~       1      NA N     3.65
##  4      4  2012 SOUTH TOTAL         2 S2TO~ Acacia~       1      NA N     3.74
##  5      5  2013 SOUTH TOTAL         2 S2TO~ Acacia~       1      NA N     3.59
##  6      1  2009 SOUTH TOTAL         2 S2TO~ Acacia~       2      NA N     2.3
##  7      2  2010 SOUTH TOTAL         2 S2TO~ Acacia~       2      NA N     2.32
##  8      3  2011 SOUTH TOTAL         2 S2TO~ Acacia~       2      NA N     2.75
##  9      4  2012 SOUTH TOTAL         2 S2TO~ Acacia~       2      NA Y     <NA>
## 10      5  2013 SOUTH TOTAL         2 S2TO~ Acacia~       2      NA N     2.86
## # ... with 7,498 more rows, 5 more variables: AXIS_1 <dbl>, AXIS_2 <chr>,
## #   CIRC <dbl>, MEASUREMENT <chr>, STEMS <chr>, and abbreviated variable name
## #   1: ORIGINAL_TAG
```

#2 reading the file of the data set with function read_tsv and then assign it to the trees object

```
trees <- read_tsv(file = "../raw-data/TREE_SURVEYS.txt",
                  col_types = list(HEIGHT = col_double(),
                                   AXIS_2 = col_double()))
```

```
## Warning: One or more parsing issues, call 'problems()' on your data frame for details,
## e.g.:
##   dat <- vroom(...)
##   problems(dat)
```

function gives me a summary of thw object trees which is now the dataset needed for the assignment

```
summary(trees)
```

```
##      SURVEY       YEAR          SITE            TREATMENT
##  Min.   :1   Min.   :2009   Length:7508        Length:7508
##  1st Qu.:2   1st Qu.:2010   Class :character   Class :character
##  Median :3   Median :2011   Mode  :character   Mode  :character
##  Mean   :3   Mean   :2011
##  3rd Qu.:4   3rd Qu.:2012
##  Max.   :5   Max.   :2013
##  NA's   :7   NA's   :7
##      BLOCK           PLOT             SPECIES           ORIGINAL_TAG
##  Min.   :1.000   Length:7508        Length:7508        Min.   :   1
##  1st Qu.:1.000   Class :character   Class :character   1st Qu.:1003
##  Median :2.000   Mode  :character   Mode  :character   Median :1890
##  Mean   :2.031                                         Mean   :1906
##  3rd Qu.:3.000                                         3rd Qu.:2802
##  Max.   :3.000                                         Max.   :3923
##  NA's   :7
##     NEW_TAG         DEAD               HEIGHT           AXIS_1
##  Min.   :1674   Length:7508        Min.   : 0.230   Min.   : 0.200
##  1st Qu.:3549   Class :character   1st Qu.: 1.850   1st Qu.: 1.900
##  Median :3582   Mode  :character   Median : 2.390   Median : 2.800
##  Mean   :3732                      Mean   : 2.515   Mean   : 3.083
##  3rd Qu.:4504                      3rd Qu.: 3.000   3rd Qu.: 4.000
##  Max.   :4600                      Max.   :10.000   Max.   :47.000
##  NA's   :7458                      NA's   :207      NA's   :210
##      AXIS_2            CIRC        MEASUREMENT          STEMS
##  Min.   : 0.000   Min.   :  0.3   Length:7508        Length:7508
##  1st Qu.: 1.800   1st Qu.:  7.0   Class :character   Class :character
##  Median : 2.610   Median : 11.5   Mode  :character   Mode  :character
##  Mean   : 2.948   Mean   : 16.0
##  3rd Qu.: 3.800   3rd Qu.: 20.4
##  Max.   :44.000   Max.   :136.0
##  NA's   :215      NA's   :414
```

#3 add a new column with the command 'nameofdataframehere$newcolnamehere' then give it the command for the value we need the estimated canopy area calculated as the value in the AXIS_1 column times the value in the AXIS_2 column.

```
trees$canopy_area <- trees$AXIS_1 * trees$AXIS_2
```

#4 Subset the trees data frame with just the SURVEY, YEAR, SITE, and canopy_area columns.

```
subset(trees, select = c('SURVEY' , 'YEAR' , 'SITE' , 'canopy_area'))
```

```
## # A tibble: 7,508 x 4
##    SURVEY  YEAR SITE  canopy_area
##     <dbl> <dbl> <chr>       <dbl>
##  1      1  2009 SOUTH       30.5
##  2      2  2010 SOUTH       69.7
##  3      3  2011 SOUTH       79.6
##  4      4  2012 SOUTH       39.0
##  5      5  2013 SOUTH       40.8
##  6      1  2009 SOUTH        6.16
##  7      2  2010 SOUTH        7.29
##  8      3  2011 SOUTH       12.5
##  9      4  2012 SOUTH       NA
## 10      5  2013 SOUTH        9.62
## # ... with 7,498 more rows
```

#5 creating a scatter plot using the ggplot() function. using the mapping function to add the aesthetics of the plot such as the data used for the x and y axis using the 'geom_point()'function to with the command size to add a size to the plots using the facet_wrap(~SPECIES) function to create a subplot for each species. I used the function labs to add the labeling of each of the axis and the title of the graph.

```
ggplot(data = trees,
       mapping = aes(x = canopy_area, y = HEIGHT, color = TREATMENT )) +
  geom_point( size = 2) +
  facet_wrap(~SPECIES ) +
 labs(x = "Canopy Area (m)", y = "Height (m)", title = "Data From Trees ")
```

```
## Warning: Removed 215 rows containing missing values (geom_point).
```

#6 logical vector that evaluates all rows that are in AXIS_1 and AXIS_2 that are below 20 this wa to eliminate outliers all values above 20.

```
trees_2 <- trees$AXIS_1 <= 20 | trees$AXIS_2 <= 20
summary(trees_2)
```

```
##    Mode   FALSE    TRUE    NA's
## logical       1    7297     210
```

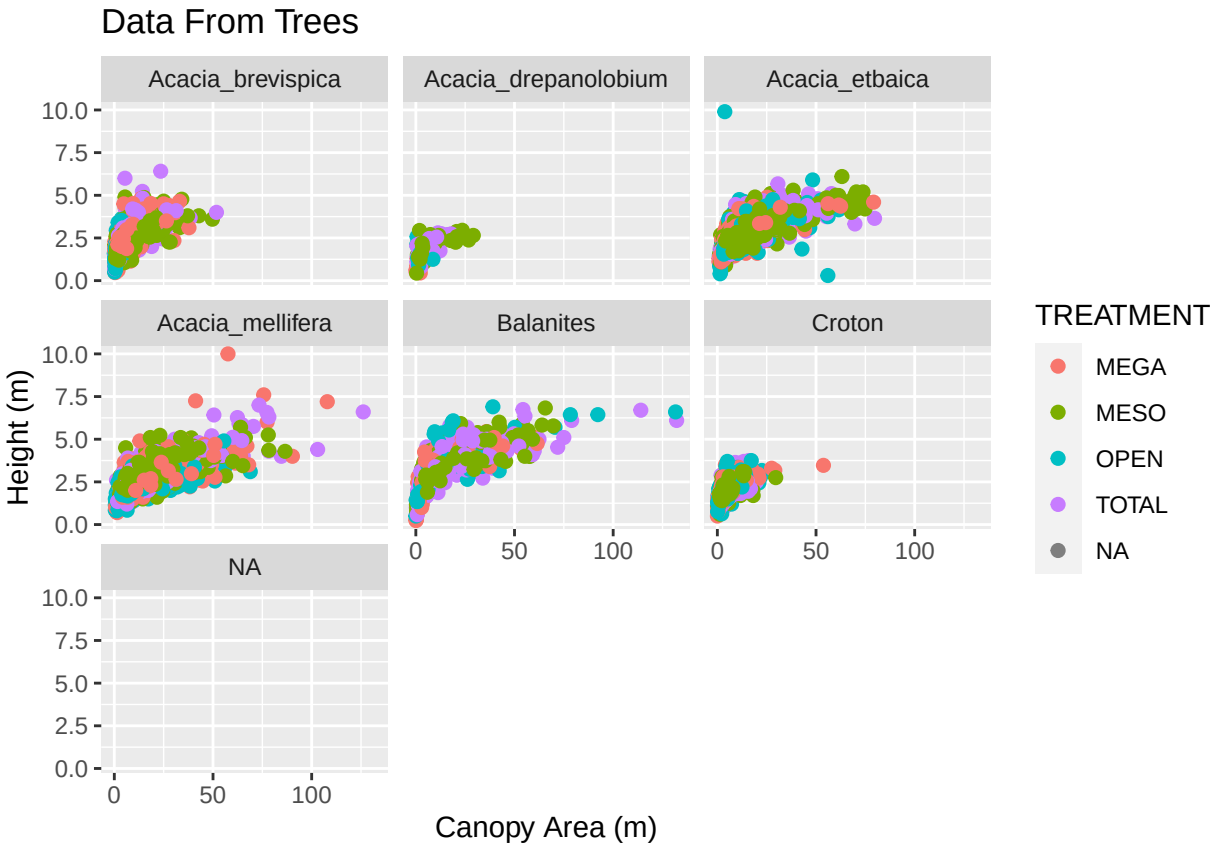
```
nrow(trees)
```

```
## [1] 7508
```

```
trees <- trees[trees_2, ]
```

```
ggplot(data = trees,
       mapping = aes(x = canopy_area, y = HEIGHT, color = TREATMENT )) +
  geom_point( size = 2) +
  facet_wrap(~SPECIES ) +
 labs(x = "Canopy Area (m)", y = "Height (m)", title = "Data From Trees ")
```

```
## Warning: Removed 215 rows containing missing values (geom_point).
```



#7 used the pipe symbol %>% which takes th eoutput of the function and into another function as an argument this linked a sequence of analysis steps.
Assignment needed to be used to the right rather than the left

```
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
```

```
trees %>%
group_by(YEAR, SPECIES) %>%
  summarize(species_abundance=n()) -> abundance
```

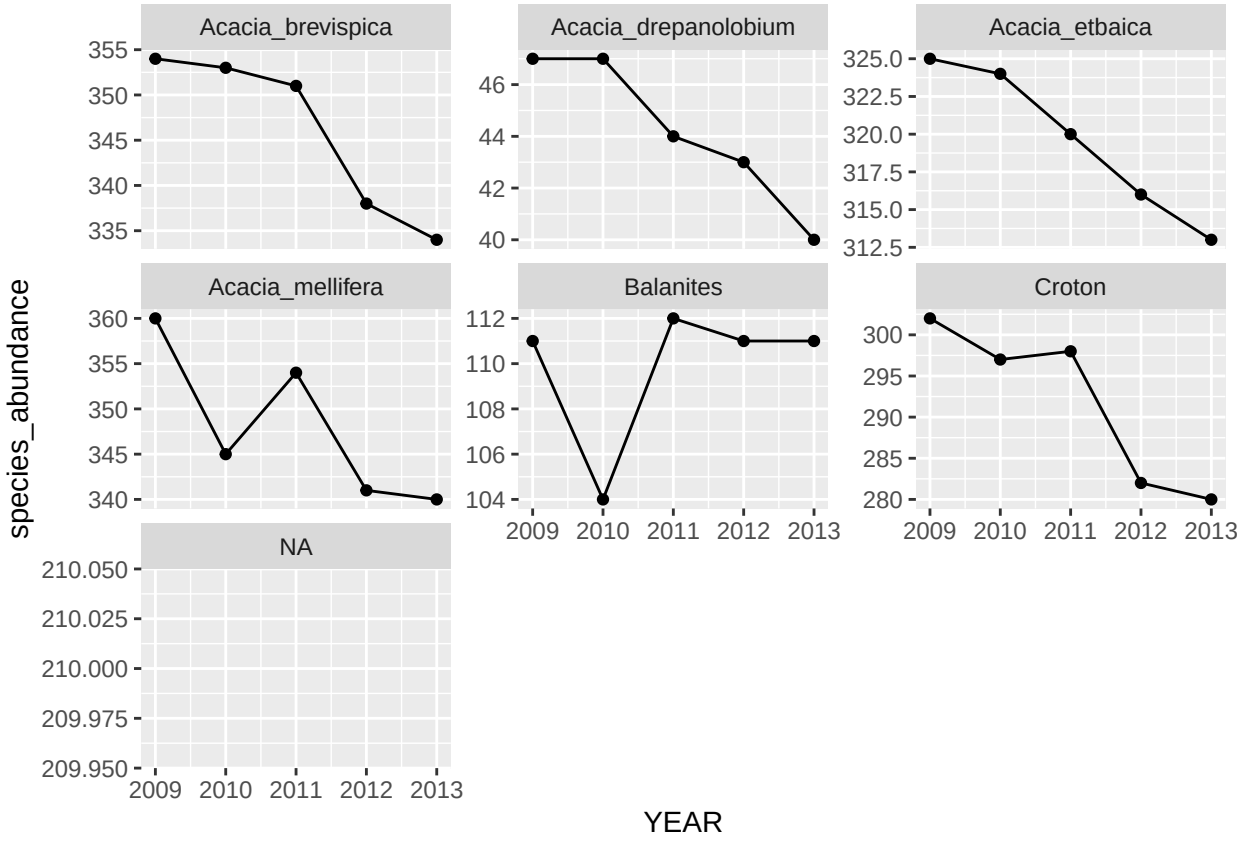
```
## `summarise()` has grouped output by 'YEAR'. You can override using the `.groups`
## argument.
```

#8 Here i made a line plot with points by using the geom_line() and the geom_point function used the facet_wrap(~SPECIES, scales = "free_y") command to see each trend clearly

```
ggplot(data = abundance,
       mapping = aes(x = YEAR, y= species_abundance)) +
  geom_line()+
  geom_point()+
  facet_wrap(~SPECIES, scales = "free_y")
```

```
## Warning: Removed 1 row(s) containing missing values (geom_path).
```

```
## Warning: Removed 1 rows containing missing values (geom_point).
```



Exercise 4 Comparing the circumference to height relationship in acacia and to the same relationship for trees in the region. This compares two data sets in a scatter plot I used the geom_points() function to specify the information we need from each of both data sets first are the comands of the trees data set-what we want on the back goes first the geom smooth command gives the smooth line to each one of the layers in the scatter plot the scale_x_log10() and scale_y_log10() functions allow us to scale the data in the scatter plot we had the issue in office hrs to get the trend lines to be straight rather than curved. used the labs() functions to add labels to the scatter plot.

```
ggplot() +
  geom_point(data = trees,
             mapping = aes(x = CIRC , y = HEIGHT), color = "gray") +
  geom_smooth(data = trees,
             mapping = aes(x = CIRC , y = HEIGHT), color = "black") +
   scale_x_log10() +
  scale_y_log10()+
```

```
  geom_point(data = acacia,
             mapping = aes(x = CIRC , y = HEIGHT ), color= "red") +
  geom_smooth(data = acacia,
             mapping = aes(x = CIRC , y = HEIGHT ), color= "red") +
   scale_x_log10() +
  scale_y_log10()+
  labs(x = "Circumference (cm)", y = "Height (m)", title = "Data From Acacia VS Trees ")
```

```
## Scale for 'x' is already present. Adding another scale for 'x', which will
## replace the existing scale.

## Scale for 'y' is already present. Adding another scale for 'y', which will
## replace the existing scale.

## `geom_smooth()` using method = 'gam' and formula 'y ~ s(x, bs = "cs")'

## Warning: Removed 416 rows containing non-finite values (stat_smooth).

## `geom_smooth()` using method = 'loess' and formula 'y ~ x'

## Warning: Removed 4 rows containing non-finite values (stat_smooth).

## Warning: Removed 416 rows containing missing values (geom_point).

## Warning: Removed 4 rows containing missing values (geom_point).
```