UHURU Data Set Visualization

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The Working directory inside this Rmarkdown r chunk is the following:

```
getwd()
```

[1] "C:/Users/charl/Sp2023_DataScience/documents"

Note: remember that working directories in a project and in an R chunk are not always the same

1. Describing the working data set

UHURU data set

2. Reading the data set

we are reading the dataset into tsv (tab separated values).

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

```
##
       SURVEY YEAR SITE BLOCK TREATMENT
                                               PLOT
                                                       ID HEIGHT AXIS1 AXIS2 CIRC
## 1
             1 2012 SOUTH
                                     TOTAL S1TOTAL
                                                            2.25
                                                                  2.75
                                                                         2.15 20.0
                               1
                                                     581
## 2
             1 2012 SOUTH
                               1
                                     TOTAL S1TOTAL 582
                                                            2.65
                                                                  4.10
                                                                         3.90 28.0
                                     TOTAL S1TOTAL 3111
                                                             1.5
## 3
             1 2012 SOUTH
                               1
                                                                  1.70
                                                                         0.85 17.0
                                     TOTAL S1TOTAL 3112
             1 2012 SOUTH
                               1
                                                            2.01
                                                                  1.80
                                                                         1.60 12.0
             1 2012 SOUTH
                                     TOTAL S1TOTAL 3113
## 5
                               1
                                                            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
## 8
             1 2012 SOUTH
                               1
                                     TOTAL S1TOTAL 3199
                                                            1.45
                                                                  2.00
                                                                         1.75 12.2
## 9
             1 2012 SOUTH
                                      MESO
                                             S1MESO
                                                                  2.15
                               1
                                                     941
                                                            1.87
                                                                         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
             1 2012 SOUTH
                                      MESO
                                             S1MESO
                                                            2.65
##
  12
                               1
                                                     944
                                                                  3.75
                                                                         3.10 27.0
##
  13
             1 2012 SOUTH
                               1
                                      MESO
                                             S1MESO
                                                     946
                                                            2.35
                                                                  2.34
                                                                         2.05 20.0
                                             S1MESO
## 14
             1 2012 SOUTH
                               1
                                      MESO
                                                     947
                                                            1.88
                                                                  2.10
                                                                         1.85 28.0
## 15
             1 2012 SOUTH
                                      MESO
                                             S1MESO 3116
                                                            2.32
                                                                  3.05
                                                                         2.63 30.0
                               1
             1 2012 SOUTH
## 16
                               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
                                                                  0.90
## 18
             1 2012 SOUTH
                               1
                                      MESO
                                             S1MESO 3119
                                                            1.05
                                                                         0.55
                                                                              8.0
## 19
             1 2012 SOUTH
                               1
                                      MESO
                                             S1MESO 3120
                                                               2
                                                                  1.25
                                                                         1.20 10.0
             1 2012 SOUTH
                                      MES<sub>0</sub>
                                             S1MESO 3131
## 20
                                                            1.28
                                                                  1.14
                                                                         1.00 10.0
```

## 21	1	2012	SOUTH	2	OPEN	S20PEN	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	S2T0TAL	110	1.65	1.90	1.54	17.0
## 31	1	2012	SOUTH	2	TOTAL	S2T0TAL	111	1.4	2.35	1.45	14.0
## 32	1	2012	SOUTH	2	TOTAL	S2T0TAL	113	2.5	3.25	2.30	22.0
## 33	1	2012	SOUTH	2	TOTAL	S2T0TAL	115	2.05	5.40	4.50	33.0
## 34	1	2012	SOUTH	2	TOTAL	S2T0TAL	116	2.26	3.50	3.10	33.0
## 35	1	2012	SOUTH	2	TOTAL	S2T0TAL	117	2.13	2.40	2.30	20.0
## 36	1	2012	SOUTH	2	TOTAL	S2T0TAL	118	1.8	3.15	2.55	22.0
## 37	1	2012	SOUTH	2	TOTAL	S2T0TAL	1211	1.85	2.00	2.27	20.0
## 38	1	2012	SOUTH	2	TOTAL	S2T0TAL	1212	1.5	2.15	1.80	15.0
## 39	1	2012	SOUTH	2	TOTAL	S2T0TAL	1213	1.87	2.34	2.05	13.0
## 40	1	2012	SOUTH	2	TOTAL	S2T0TAL	1214	1.58	1.28	0.75	11.0
## 41	1	2012	SOUTH	2		S2T0TAL		2.05	2.10	1.75	17.0
## 42	1	2012	SOUTH	2		S2T0TAL		1.75	2.45	3.28	16.0
## 43	1	2012	SOUTH	2		S2T0TAL		1.49	1.50	1.45	
## 44			SOUTH	2		S2T0TAL		1.28	2.00	0.90	10.0
## 45			SOUTH	2		S2T0TAL		1.49	2.35	1.65	13.0
## 46			SOUTH	2		S2T0TAL		1.07	1.20	0.95	11.0
## 47			SOUTH	2		S2TOTAL		1.48	1.25	1.20	9.0
## 48			SOUTH	2		S2TOTAL		1.25	1.25	0.90	10.0
## 49			SOUTH	2		S2TOTAL		1.41	1.41	1.40	
## 50			SOUTH	2		S2TOTAL		1.6	1.60	1.30	
## 51			SOUTH	2		S2TOTAL		1.2	1.20	1.30	
## 52			SOUTH	2		S2TOTAL		1.49	1.49	1.20	8.0
## 53			SOUTH	2		S2TOTAL		1.5	1.50	1.50	
## 54			SOUTH	2	_	S2TOTAL		1.65	1.65	2.00	
## 55			SOUTH	2	_	S2TOTAL		1.13	1.13	1.20	
## 56			SOUTH	2		S2TOTAL		1.25	1.25	0.90	
## 57			SOUTH	2		S2TOTAL		1.1	1.20	1.10	
## 58			SOUTH	2		S2TOTAL		2.2	2.70	2.40	
## 59			SOUTH	2		S2TOTAL			1.65		
## 60 ## 61			SOUTH	2 2		S2TOTAL S2TOTAL		1.6	2.45	2.10	
## 61 ## 62			SOUTH SOUTH	2				1.55	2.40	2.15	
## 62 ## 63			SOUTH	2		S2TOTAL S2TOTAL		1.5 1.03	2.40 1.20	1.00	
## 64			SOUTH	2		S2TOTAL		2.14	1.90	1.70	
## 65			SOUTH	2		S2TOTAL		1.2	1.90	1.65	
## 66			SOUTH	2		S2TOTAL		1.05	1.10	1.00	9.0
## 67			SOUTH	2		S2TOTAL		1.8	2.60	2.40	
## 68			SOUTH	2		S2TOTAL		1.2	1.00		7.0
## 69			SOUTH	2		S2TOTAL		1.75	1.40	1.10	
## 70			SOUTH	2		S2TOTAL		1.45	3.10	1.80	
## 71			SOUTH	2		S2TOTAL			1.20	1.10	5.0
## 72			SOUTH	2		S2TOTAL			3.10	2.58	
## 73			SOUTH	2		S2TOTAL			1.70	1.40	
## 74			SOUTH	2		S2T0TAL		1.98	2.85	2.70	

##	75	1	2012	SOUTH	2	TOTAL.	S2T0TAL	3133	1.26	1.95	1.75 17.0
##				SOUTH	2		S2TOTAL		1.11	1.95	1.50 10.0
	77			SOUTH	2		S2TOTAL		1.14	1.32	1.05 10.0
	78			SOUTH	2		S2TOTAL		1.26	1.60	1.40 10.0
##				SOUTH	2		S2TOTAL		1.3	1.40	0.80 10.0
##				SOUTH	2		S2TOTAL		1.29	1.44	1.35 13.0
##				SOUTH	2		S2TOTAL		1.31	1.35	1.15 7.0
##				SOUTH	2		S2TOTAL		1.15	1.70	1.28 10.0
##				SOUTH	2		S2TOTAL		1.87	3.40	1.85 15.0
##				SOUTH	2		S2TOTAL		1.47	2.10	1.61 8.0
##				SOUTH	2		S2TOTAL		1.05	1.79	1.50 10.0
##				SOUTH	2		S2TOTAL		2.1	4.90	3.75 25.0
##				SOUTH	2		S2TOTAL		1.99	1.80	1.35 13.0
##				SOUTH	2		S2TOTAL		1.42	1.90	1.80 14.0
##				SOUTH	2		S2TOTAL		1.5	2.11	1.75 12.0
##				SOUTH	2		S2TOTAL		1.06	1.05	0.85 4.0
##				SOUTH	2		S2TOTAL		1.49	1.50	1.15 13.0
##				SOUTH	2		S2TOTAL		1.49	1.60	1.50 14.0
##				SOUTH	2		S2TOTAL		1.93	1.74	1.20 14.0
##				SOUTH	2	_	S2TOTAL		1.2	1.60	1.30 10.0
##				SOUTH	2	_	S2TOTAL			1.25	1.10 11.0
##				SOUTH	2		S2TOTAL		1.65		1.10 11.0
							S2TOTAL S2TOTAL		1.52	1.49	
##				SOUTH SOUTH	2				1.43	2.05	1.54 13.0 1.25 13.0
##					2		S2TOTAL		1.25	1.40	
##				SOUTH	2		S2TOTAL		1.88	2.65	2.64 20.0
	100			SOUTH	2		S2TOTAL		1.03	1.40	0.60 13.0
	101			SOUTH	2		S2TOTAL		1.1	1.30	1.20 10.0
	102			SOUTH	2		S2TOTAL		1.4	1.05	1.00 10.0
	103			SOUTH	2		S2TOTAL		1.05	1.55	0.90 10.0
	104			SOUTH	2		S2TOTAL		1.18	1.20	1.00 7.0
	105			SOUTH	2		S2TOTAL		1.4	1.30	1.85 13.0
	106			SOUTH	2		S2TOTAL		1.37	2.67	2.19 19.0
	107			SOUTH	2		S2TOTAL		1.32	2.15	1.55 11.0
	108			SOUTH	2	MEGA	S2MEGA	182	1.55	2.20	1.20 20.0
	109			SOUTH	2	MEGA	S2MEGA	183	1.3	1.80	0.90 8.0
	110			SOUTH	2	MEGA	S2MEGA	184	1.24	1.20	1.20 25.0
	111	_		SOUTH	2	MEGA	S2MEGA	185	1.5	2.10	1.75 16.0
	112			SOUTH	2	MEGA	S2MEGA	186	1.65	2.50	2.20 15.0
	113			SOUTH	2	MEGA	S2MEGA	187	2.17	2.00	1.20 15.0
	114			SOUTH	2	MEGA	S2MEGA		1.28	1.60	1.50 10.0
	115			SOUTH	2	MEGA	S2MEGA		1.07	1.50	1.50 10.0
	116			SOUTH	2	MEGA	S2MEGA		0.67	1.00	0.80 8.0
	117			SOUTH	2	MEGA	S2MEGA		0.68	0.70	0.60 4.0
	118			SOUTH	2	MEGA	S2MEGA		1.87	1.60	1.40 9.0
	119			SOUTH	2	MEGA	S2MEGA		1.35	1.90	1.50 14.0
	120			SOUTH	2	MEGA	S2MEGA		1.75	2.10	2.10 15.0
	121			SOUTH	2	MESO	S2MESO		1.75	3.30	2.50 23.0
	122			SOUTH	2	MESO	S2MESO		1.64	2.30	2.00 14.0
	123			SOUTH	2	MESO	S2MES0		1.42	0.90	0.80 10.0
	124			SOUTH	3	OPEN	S30PEN		dead	NA	NA NA
	125			SOUTH	3	OPEN	S30PEN		0.9	1.30	1.10 11.0
	126			SOUTH	3		SSTOTAL		dead	NA	NA NA
	127			SOUTH	3		SSTOTAL		1.8	2.60	2.60 15.0
##	128	1	2012	SOUTH	3	TOTAL	S3TOTAL	1063	2.47	3.10	2.20 18.0

```
1 2012 SOUTH
## 129
                                    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
                                                           1.9 1.80 1.50 20.0
                              3
                                    TOTAL S3TOTAL 1066
## 132
            1 2012 SOUTH
                                    TOTAL S3TOTAL 1067
                              3
                                                          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
            1 2012 SOUTH
                                    TOTAL S3TOTAL 2139
## 136
                              3
                                                          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
                                                                      1.20 4.0
                                    TOTAL S3TOTAL 2151
                                                             1
                                                                1.40
## 139
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2152
                                                          1.45 1.50
                                                                      1.30 10.0
                                    TOTAL S3TOTAL 2153
## 140
            1 2012 SOUTH
                              3
                                                             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
                                                          1.05
                                                               1.40
## 149
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2172
                                                                       0.95
                                                                             7.0
## 150
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2173
                                                          1.45 1.60
                                                                       1.10
            1 2012 SOUTH
                                    TOTAL S3TOTAL 2174
                                                          1.15 1.10
                                                                       0.90 5.0
## 151
                              3
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2175
                                                          1.42 1.45
                                                                       1.30 13.0
## 152
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2176
                                                          1.02 1.20
                                                                      1.00 8.0
## 153
## 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
            1 2012 SOUTH
                              3
                                     MESO S3MESO 1421
## 156
                                                          1.95
                                                               2.20
                                                                      1.60 13.0
## 157
                                     MESO S3MESO 1422
            1 2012 SOUTH
                              3
                                                                         NA
                                                                              NA
                                                          dead
                                                                  NA
       FLOWERS BUDS FRUITS
##
                              ANT
## 1
             0
                  0
                         10
                               CS
## 2
             0
                  0
                        150
                               TP
## 3
             2
                  1
                         50
                               TP
## 4
                         75
                               CS
             0
                  0
## 5
             0
                  0
                         20
                               CS
## 6
             0
                          0
                                Ε
                  0
## 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
             2
                         60
## 14
                  0
                               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
                               CS
## 23
             0
                  0
                         45
## 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 43	0	0 0	0 40	TP TP
##	43	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	Ö	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 75	0	0	25	AB_TP
##	75 76	0	0	0	TP
##	76 77	0	0 0	0	TP TP
## ##	77 78	0	0	0	CS
##	10	U	U	U	CD

## 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 ## 115	0	0	40 60	TP TP
## 115 ## 116	0	0	0	CS
## 110	0	0	0	TP
## 117	0	0	40	CS
## 110	0	0	20	CS
## 119	0	0	75	TP
## 120	0	0	20	CM
## 121	0	0	0	TP
## 123	0	0	0	E
## 124	NA	NA	NA	ь
## 124	0	0	0	TP
## 126	NA	NA	NA	11
## 120	0	0	50	TP
## 127	0	0	0	TP
## 129	0	0	0	TP
## 130	0	0	2	TP
## 131	0	0	25	TP
## 132	0	0	0	TP
102	•	v	v	

```
## 133
                   0
                                TP
## 134
              0
                   0
                           0
                                TP
## 135
                   0
                           0
                                TP
## 136
                   0
                           0
                                TP
              0
## 137
              0
                   0
                           0
                                TP
## 138
              0
                   0
                           0
                                TP
## 139
              0
                   0
                           0
                                TP
                           0
## 140
              0
                   0
                                TP
## 141
              0
                   0
                           0
                                TP
## 142
              0
                   0
                           0
                                TP
## 143
              0
                   0
                           0
                                TP
                           0
                                TP
## 144
              0
                   0
                   0
                           0
                                TP
## 145
              0
## 146
                   0
                           0
                                ΤP
              0
## 147
              0
                   0
                           0
                                TP
## 148
              0
                   0
                           8
                                TP
## 149
              0
                   0
                           0
                                TP
## 150
                   0
                           0
                                TP
## 151
                   0
                           0
                                TP
              0
## 152
              0
                   0
                           0
                                TP
## 153
             0
                   0
                           0
                                TP
## 154
              0
                   0
                           0
                                TP
## 155
                   0
                          20
                                TP
              0
## 156
             0
                   0
                           2
                                CS
## 157
             NA
                  NA
                          NA
```

Assign the data to a variable so we can wirk with it

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

head(acacia)

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

str(acacia)

```
$ SITE
               : chr "SOUTH" "SOUTH" "SOUTH" ...
##
    $ BLOCK
              : int
                      1 1 1 1 1 1 1 1 1 1 ...
    $ TREATMENT: chr
                      "TOTAL" "TOTAL" "TOTAL" "TOTAL" ...
                      "S1TOTAL" "S1TOTAL" "S1TOTAL" "S1TOTAL" ...
    $ PI.OT
               : chr
    $ TD
               : int
                      581 582 3111 3112 3113 3114 3115 3199 941 942 ...
##
                     "2.25" "2.65" "1.5" "2.01" ...
    $ HEIGHT
              : chr
                     2.75 4.1 1.7 1.8 1.84 1.62 1.95 2 2.15 5.55 ...
    $ AXIS1
               : num
##
    $ AXIS2
               : num
                      2.15 3.9 0.85 1.6 1.42 0.85 0.9 1.75 1.82 4.82 ...
##
    $ CIRC
               : num
                      20 28 17 12 13 15 9 12.2 13 35 ...
##
    $ FLOWERS : int
                    0 0 2 0 0 0 0 0 0 0 ...
    $ BUDS
               : int
                     0 0 1 0 0 0 0 0 0 0 ...
##
                     10 150 50 75 20 0 0 25 0 50 ...
    $ FRUITS
               : int
                     "CS" "TP" "TP" "CS" ...
    $ ANT
               : chr
numbers <- 1:10
numbers
```

[1] 1 2 3 4 5 6 7 8 9 10

numbers[3:6]

[1] 3 4 5 6

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 20.0
## 2
           1 2012 SOUTH
                            1
                                  TOTAL S1TOTAL 582
                                                       2.65 4.10
                                                                   3.90 28.0
                                                        1.5 1.70 0.85 17.0
## 3
           1 2012 SOUTH
                                  TOTAL S1TOTAL 3111
                            1
           1 2012 SOUTH
                                  TOTAL S1TOTAL 3112
                                                       2.01 1.80 1.60 12.0
## 4
                            1
           1 2012 SOUTH
                                  TOTAL S1TOTAL 3113
## 5
                                                       1.75 1.84
                                                                  1.42 13.0
                            1
## 6
           1 2012 SOUTH
                            1
                                  TOTAL S1TOTAL 3114
                                                       1.65
                                                            1.62
                                                                   0.85 15.0
## 7
           1 2012 SOUTH
                                  TOTAL S1TOTAL 3115
                                                        1.2 1.95 0.90 9.0
                            1
## 8
           1 2012 SOUTH
                            1
                                  TOTAL S1TOTAL 3199
                                                       1.45
                                                            2.00 1.75 12.2
           1 2012 SOUTH
                                                       1.87 2.15 1.82 13.0
## 9
                                   MESO S1MESO 941
                            1
## 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
                                   MESO
                                         S1MESO 944
                                                       2.65 3.75 3.10 27.0
                            1
## 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
           1 2012 SOUTH
                                   MESO S1MESO 3116
                                                       2.32 3.05 2.63 30.0
## 15
                            1
           1 2012 SOUTH
                                   MESO S1MESO 3117
                                                       2.39 2.21 2.10 13.0
## 16
                            1
## 17
           1 2012 SOUTH
                            1
                                   MESO
                                         S1MESO 3118
                                                        2.2 1.80 1.50 10.0
## 18
           1 2012 SOUTH
                                         S1MESO 3119
                                                       1.05 0.90 0.55 8.0
                            1
                                   MESO
## 19
           1 2012 SOUTH
                            1
                                   MESO S1MESO 3120
                                                          2 1.25
                                                                  1.20 10.0
           1 2012 SOUTH
                                   MESO S1MESO 3131
                                                       1.28 1.14
                                                                  1.00 10.0
## 20
                            1
           1 2012 SOUTH
                            2
                                   OPEN S20PEN 341
## 21
                                                       dead
                                                               NA
                                                                     NΑ
                                                                          NΑ
                            2
                                  TOTAL S2TOTAL 3178
## 22
           1 2012 SOUTH
                                                        1.4
                                                            2.50
                                                                   2.15 18.0
## 23
           1 2012 SOUTH
                            2
                                  TOTAL S2TOTAL
                                                        1.9 3.31
                                                101
                                                                  2.65 15.0
                                  TOTAL S2TOTAL
## 24
           1 2012 SOUTH
                            2
                                                       1.75 2.70
                                                                   2.55 16.0
                                                 102
## 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
```

## 2	7 1	2012	SOUTH	2	TOTAL	S2T0TAL	105	2.02	2.85	1.49 17.0
## 2	8 1	2012	SOUTH	2		S2TOTAL	108	1.9	3.10	2.85 19.0
## 2		2012	SOUTH	2		S2TOTAL	109	1.85	2.45	1.90 19.0
## 3			SOUTH	2		S2TOTAL	110	1.65	1.90	1.54 17.0
## 3			SOUTH	2		S2TOTAL	111	1.4	2.35	1.45 14.0
## 3			SOUTH	2		S2TOTAL	113	2.5	3.25	2.30 22.0
## 3			SOUTH	2		S2TOTAL	115	2.05	5.40	4.50 33.0
## 3			SOUTH	2		S2TOTAL	116	2.26	3.50	3.10 33.0
## 3			SOUTH	2		S2TOTAL	117	2.13	2.40	2.30 20.0
## 3			SOUTH	2		S2TOTAL	118	1.8	3.15	2.55 22.0
## 3			SOUTH	2	_	S2TOTAL		1.85	2.00	2.27 20.0
## 3			SOUTH	2	_	S2TOTAL		1.5	2.15	1.80 15.0
## 3			SOUTH	2		S2TOTAL		1.87	2.34	2.05 13.0
## 4			SOUTH	2		S2TOTAL		1.58	1.28	0.75 11.0
## 4			SOUTH	2		S2TOTAL		2.05	2.10	1.75 17.0
## 4			SOUTH	2		S2TOTAL				3.28 16.0
								1.75	2.45	
## 4			SOUTH	2		S2TOTAL		1.49	1.50	1.45 13.0
## 4			SOUTH SOUTH	2		S2TOTAL		1.28	2.00	0.90 10.0 1.65 13.0
## 4				2		S2TOTAL		1.49	2.35	
## 4			SOUTH	2		S2TOTAL		1.07	1.20	0.95 11.0
## 4			SOUTH	2		S2TOTAL		1.48	1.25	1.20 9.0
## 4			SOUTH	2		S2TOTAL		1.25	1.25	0.90 10.0
## 4			SOUTH	2		S2TOTAL		1.41	1.41	1.40 14.0
## 5			SOUTH	2		S2TOTAL		1.6	1.60	1.30 13.0
## 5			SOUTH	2		S2TOTAL		1.2	1.20	1.30 14.0
## 5			SOUTH	2		S2TOTAL		1.49	1.49	1.20 8.0
## 5			SOUTH	2		S2TOTAL		1.5	1.50	1.50 14.0
## 5			SOUTH	2		S2TOTAL		1.65	1.65	2.00 20.0
## 5			SOUTH	2		S2TOTAL		1.13	1.13	1.20 10.0
## 5			SOUTH	2		S2TOTAL		1.25	1.25	0.90 10.0
## 5			SOUTH	2		S2TOTAL		1.1	1.20	1.10 10.0
## 5			SOUTH	2		S2TOTAL		2.2	2.70	2.40 25.0
## 5			SOUTH	2		S2TOTAL		1.45	1.65	1.25 10.0
## 6			SOUTH	2		S2TOTAL		1.6	2.45	2.10 13.0
## 6			SOUTH	2		S2TOTAL		1.55	2.40	1.80 13.0
## 6			SOUTH	2		S2TOTAL		1.5	2.40	2.15 13.0
## 6	-		SOUTH	2		S2TOTAL		1.03	1.20	1.00 10.0
## 6			SOUTH	2		S2TOTAL		2.14	1.90	1.70 13.0
## 6			SOUTH	2		S2TOTAL		1.2	1.90	1.65 12.0
## 6			SOUTH	2		S2TOTAL		1.05	1.10	1.00 9.0
## 6			SOUTH	2		S2TOTAL		1.8	2.60	2.40 15.0
## 6			SOUTH	2	TOTAL	S2TOTAL	2132	1.2	1.00	0.95 7.0
## 6			SOUTH	2		S2TOTAL		1.75	1.40	1.10 10.0
## 7			SOUTH	2	TOTAL	S2TOTAL	2134	1.45	3.10	1.80 10.0
## 7			SOUTH	2		S2TOTAL		1.17	1.20	1.10 5.0
## 7			SOUTH	2	TOTAL	S2TOTAL	2136	2.15	3.10	2.58 22.0
## 7			SOUTH	2	TOTAL	S2TOTAL	2137	1.7	1.70	1.40 12.0
## 7			SOUTH	2		S2TOTAL		1.98	2.85	2.70 12.0
## 7			SOUTH	2		S2T0TAL		1.26	1.95	1.75 17.0
## 7			SOUTH	2	TOTAL	S2T0TAL	3134	1.11	1.95	1.50 10.0
## 7	7 1	2012	SOUTH	2	TOTAL	S2T0TAL	3135	1.14	1.32	1.05 10.0
## 7	8 1	2012	SOUTH	2	TOTAL	S2T0TAL	3136	1.26	1.60	1.40 10.0
## 7	9 1	2012	SOUTH	2	TOTAL	S2T0TAL	3137	1.3	1.40	0.80 10.0
## 8	0 1	2012	SOUTH	2	TOTAL	S2T0TAL	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
##				SOUTH	2	_	S2TOTAL		1.15	1.70	1.28 10.0
##				SOUTH	2		S2TOTAL		1.87	3.40	1.85 15.0
##				SOUTH	2		S2TOTAL		1.47	2.10	1.61 8.0
##				SOUTH	2		S2TOTAL		1.05	1.79	1.50 10.0
##				SOUTH	2		S2TOTAL		2.1	4.90	3.75 25.0
##				SOUTH	2		S2TOTAL		1.99	1.80	1.35 13.0
##				SOUTH	2		S2TOTAL		1.42	1.90	1.80 14.0
	89			SOUTH	2		S2TOTAL		1.5	2.11	1.75 12.0
##				SOUTH	2		S2TOTAL		1.06	1.05	0.85 4.0
##				SOUTH	2	_	S2TOTAL		1.49	1.50	1.15 13.0
##				SOUTH	2		S2TOTAL		1.8	1.60	1.50 14.0
##				SOUTH	2	_	S2TOTAL		1.93	1.74	1.20 14.0
##				SOUTH	2		S2TOTAL		1.2	1.60	1.30 10.0
##				SOUTH	2		S2TOTAL		1.65	1.25	1.10 11.0
##				SOUTH	2		S2TOTAL		1.52	1.49	1.10 11.0
##				SOUTH	2		S2TOTAL		1.43	2.05	1.54 13.0
	98			SOUTH	2		S2TOTAL		1.45	1.40	1.25 13.0
##				SOUTH	2		S2TOTAL		1.23	2.65	2.64 20.0
	100			SOUTH	2		S2TOTAL		1.03	1.40	0.60 13.0
	100			SOUTH	2	_	S2TOTAL		1.03	1.30	1.20 10.0
	101			SOUTH	2		S2TOTAL				1.00 10.0
	102			SOUTH	2		S2TOTAL		1.4	1.05 1.55	0.90 10.0
						_			1.05		
	104			SOUTH SOUTH	2		S2TOTAL S2TOTAL		1.18	1.20	1.00 7.0
	105			SOUTH	2				1.4	1.30	1.85 13.0
	106				2		S2TOTAL		1.37	2.67	2.19 19.0
	107			SOUTH	2		S2TOTAL		1.32	2.15	1.55 11.0
	108			SOUTH	2	MEGA	S2MEGA	182	1.55	2.20	1.20 20.0
	109			SOUTH	2	MEGA	S2MEGA	183	1.3	1.80	0.90 8.0
	110			SOUTH	2	MEGA	S2MEGA	184	1.24	1.20	1.20 25.0
	111			SOUTH	2	MEGA	S2MEGA	185	1.5	2.10	1.75 16.0
	112			SOUTH	2	MEGA	S2MEGA	186	1.65	2.50	2.20 15.0
	113			SOUTH	2	MEGA	S2MEGA	187	2.17	2.00	1.20 15.0
	114			SOUTH	2	MEGA	S2MEGA	188	1.28	1.60	1.50 10.0
	115			SOUTH	2	MEGA	S2MEGA	189	1.07	1.50	1.50 10.0
	116			SOUTH	2	MEGA	S2MEGA	190	0.67	1.00	0.80 8.0
	117			SOUTH	2	MEGA	S2MEGA	191	0.68	0.70	0.60 4.0
	118			SOUTH	2	MEGA	S2MEGA		1.87	1.60	1.40 9.0
	119			SOUTH	2	MEGA			1.35	1.90	1.50 14.0
	120			SOUTH	2	MEGA			1.75	2.10	2.10 15.0
	121			SOUTH	2	MESO	S2MES0		1.75	3.30	2.50 23.0
	122			SOUTH	2	MESO	S2MES0		1.64	2.30	2.00 14.0
	123			SOUTH	2	MESO	S2MESO		1.42	0.90	0.80 10.0
	124			SOUTH	3	OPEN	S30PEN		dead	NA	NA NA
	125			SOUTH	3	OPEN	S30PEN		0.9	1.30	1.10 11.0
	126			SOUTH	3		SSTOTAL		dead	NA	NA NA
	127			SOUTH	3		SSTOTAL		1.8	2.60	2.60 15.0
	128			SOUTH	3		SSTOTAL		2.47	3.10	2.20 18.0
	129			SOUTH	3		SSTOTAL		2.15	1.60	1.10 17.0
	130			SOUTH	3		SSTOTAL		1.7	2.50	2.15 15.0
	131			SOUTH	3		SSTOTAL		1.9	1.80	1.50 20.0
	132			SOUTH	3		SSTOTAL		1.95	2.10	1.90 13.0
	133			SOUTH	3		SSTOTAL		1.8	1.70	1.40 13.0
##	134	1	2012	SOUTH	3	TOTAL	S3TOTAL	1069	1.4	2.00	1.60 14.0

```
1 2012 SOUTH
                                     TOTAL S3TOTAL 1070
## 135
                              3
                                                              1 1.30 1.20 7.0
                                                           1.75
## 136
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2139
                                                                1.20 1.10 13.0
            1 2012 SOUTH
## 137
                              3
                                     TOTAL S3TOTAL 2140
                                                           1.28 1.50
                                                                        0.95
                                                                             4.0
## 138
            1 2012 SOUTH
                                     TOTAL S3TOTAL 2151
                              3
                                                              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
            1 2012 SOUTH
                                     TOTAL S3TOTAL 2155
                                                                 2.00
                                                                       1.80 12.0
## 142
                              3
                                                           1.51
## 143
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2156
                                                           1.17
                                                                 1.10
                                                                        0.90 10.0
## 144
            1 2012 SOUTH
                              3
                                                           1.33 1.90
                                                                       1.85 14.0
                                     TOTAL S3TOTAL 2157
## 145
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2158
                                                            1.3 1.10
                                                                       0.85 8.0
                                     TOTAL S3TOTAL 2159
## 146
            1 2012 SOUTH
                              3
                                                           1.13
                                                                1.10
                                                                        0.90 10.0
                                     TOTAL S3TOTAL 2160
## 147
            1 2012 SOUTH
                              3
                                                           1.58
                                                                1.40
                                                                        1.40 13.0
## 148
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2171
                                                           1.06
                                                                        1.00
                                                                1.40
                                                                             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
            1 2012 SOUTH
## 157
                              3
                                      MESO S3MESO 1422
                                                                          NA
                                                           dead
                                                                   NA
                                                                               NA
##
       FLOWERS BUDS FRUITS
                              ANT
## 1
             0
                   0
                         10
                               CS
## 2
             0
                   0
                        150
                               TP
## 3
             2
                         50
                               ΤP
                   1
## 4
                         75
             0
                   0
                               CS
## 5
             0
                   0
                         20
                               CS
## 6
             0
                   0
                          0
                                Ε
## 7
             0
                   0
                          0
                               CS
## 8
             0
                   0
                         25
                               CS
## 9
             0
                   0
                          0
                               TP
## 10
                         50
                               TP
             0
                   0
## 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
                               TP
             0
## 18
             0
                   0
                          0
                               CS
                          0
## 19
             0
                   0
                               CM
## 20
             0
                   0
                          0
                               TP
## 21
            NA
                 NA
                         NA
## 22
                               CS
             0
                   0
                          5
## 23
             0
                  0
                         45
                               CS
## 24
                         35
            40
                  50
                               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
"# O-I	U	J	J	CD

## 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 ## 103	0	0	0	CS CM
## 103 ## 104	0 0	0	0 0	TP
## 104 ## 105	0	0	30	CS
## 105 ## 106	0	0	50 50	TP
## 106	0	0	10	CS
## 107 ## 108	0	0	0	CS
## 108	0	0	15	CS
## 109 ## 110	0	0	10	CS
## 110 ## 111	5	0	200	CS
## 111 ## 112	0	0	80	CS
## 112 ## 113	0	0	150	TP
## 113 ## 114	0	0	40	TP
## 114	0	0	60	TP
## 116	0	0	0	CS
## 110	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	Ö	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	Ö	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	

Accessing elements of a data frame

It is similar to what we do for vectors, but there are two dimensions to a data frame

acacia[8]

## 1 2.25	
## 2 2.65	
## 3 1.5	
## 4 2.01	
## 5 1.75	
## 6 1.65	
## 7 1.2	
## 8 1.45	
## 9 1.87	
## 10 2.38	
## 11 2.58	
## 12 2.65	
## 13 2.35	
## 14 1.88	
## 15 2.32	
## 16 2.39	
## 17 2.2	
## 18 1.05	
## 19 2	
## 20 1.28	
## 21 dead	
## 22 1.4	
## 23 1.9	
## 24 1.75	
## 25 1.8	
## 26 2.7	
## 27 2.02	

```
## 28
          1.9
## 29
         1.85
## 30
         1.65
## 31
          1.4
## 32
          2.5
## 33
         2.05
## 34
         2.26
         2.13
## 35
## 36
          1.8
## 37
         1.85
          1.5
## 38
## 39
         1.87
## 40
         1.58
## 41
         2.05
## 42
         1.75
         1.49
## 43
## 44
         1.28
## 45
         1.49
## 46
         1.07
## 47
         1.48
## 48
         1.25
## 49
          1.41
## 50
          1.6
## 51
          1.2
         1.49
## 52
## 53
          1.5
## 54
         1.65
## 55
         1.13
## 56
         1.25
## 57
          1.1
## 58
          2.2
## 59
         1.45
## 60
          1.6
## 61
         1.55
## 62
          1.5
## 63
         1.03
## 64
         2.14
## 65
          1.2
## 66
         1.05
          1.8
## 67
          1.2
## 68
## 69
         1.75
## 70
         1.45
## 71
         1.17
## 72
         2.15
## 73
          1.7
## 74
         1.98
## 75
          1.26
## 76
         1.11
## 77
         1.14
## 78
         1.26
## 79
          1.3
## 80
         1.29
## 81
          1.31
```

```
## 82
         1.15
## 83
         1.87
## 84
         1.47
## 85
         1.05
## 86
          2.1
## 87
         1.99
## 88
         1.42
          1.5
## 89
## 90
         1.06
## 91
         1.49
## 92
          1.8
## 93
         1.93
## 94
          1.2
## 95
         1.65
## 96
         1.52
## 97
         1.43
## 98
         1.25
## 99
         1.88
         1.03
## 100
## 101
          1.1
          1.4
## 102
## 103
         1.05
## 104
         1.18
## 105
          1.4
## 106
         1.37
## 107
         1.32
## 108
         1.55
## 109
          1.3
## 110
         1.24
## 111
          1.5
## 112
         1.65
## 113
         2.17
## 114
         1.28
         1.07
## 115
## 116
         0.67
## 117
         0.68
## 118
         1.87
## 119
         1.35
## 120
         1.75
## 121
         1.75
## 122
         1.64
## 123
         1.42
## 124
         dead
## 125
          0.9
## 126
         dead
## 127
          1.8
## 128
         2.47
## 129
         2.15
## 130
          1.7
## 131
          1.9
## 132
         1.95
## 133
          1.8
## 134
          1.4
## 135
             1
```

```
## 136
     1.75
     1.28
## 137
## 138
      1
## 139
     1.45
## 140
## 141
     1.03
## 142
     1.51
## 143
     1.17
## 144
     1.33
## 145
     1.3
## 146
     1.13
## 147
     1.58
## 148
     1.06
## 149
     1.05
## 150
     1.45
## 151
     1.15
## 152
     1.42
## 153
     1.02
## 154
      1.4
## 155
     1.45
## 156
     1.95
## 157
     dead
acacia$SURVEY
   ##
  ## [149] 1 1 1 1 1 1 1 1 1
acacia[, "SURVEY"]
   ##
  ## [149] 1 1 1 1 1 1 1 1 1
acacia$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"
  [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"
```

as.numeric(acacia\$HEIGHT)

Warning: NAs introduced by coercion

```
## [1] 2.25 2.65 1.50 2.01 1.75 1.65 1.20 1.45 1.87 2.38 2.58 2.65 2.35 1.88 2.32 ## [16] 2.39 2.20 1.05 2.00 1.28 NA 1.40 1.90 1.75 1.80 2.70 2.02 1.90 1.85 1.65 ## [31] 1.40 2.50 2.05 2.26 2.13 1.80 1.85 1.50 1.87 1.58 2.05 1.75 1.49 1.28 1.49 ## [46] 1.07 1.48 1.25 1.41 1.60 1.20 1.49 1.50 1.65 1.13 1.25 1.10 2.20 1.45 1.60 ## [61] 1.55 1.50 1.03 2.14 1.20 1.05 1.80 1.20 1.75 1.45 1.17 2.15 1.70 1.98 1.26 ## [76] 1.11 1.14 1.26 1.30 1.29 1.31 1.15 1.87 1.47 1.05 2.10 1.99 1.42 1.50 1.06 ## [91] 1.49 1.80 1.93 1.20 1.65 1.52 1.43 1.25 1.88 1.03 1.10 1.40 1.05 1.18 1.40 ## [106] 1.37 1.32 1.55 1.30 1.24 1.50 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 NA 0.90 NA 1.80 2.47 2.15 1.70 1.90 1.95 1.80 1.40 1.00 ## [136] 1.75 1.28 1.00 1.45 1.00 1.03 1.51 1.17 1.33 1.30 1.13 1.58 1.06 1.05 1.45 ## [151] 1.15 1.42 1.02 1.40 1.45 1.95 NA
```

Replacing numbers in a data frame

```
numbers
```

```
## [1] 1 2 3 4 5 6 7 8 9 10
```

We identified that the HEIGHT should be numeric

```
acacia$HEIGHT <- as.numeric(acacia$HEIGHT)
```

Warning: NAs introduced by coercion

acacia\$HEIGHT

```
##
     [1] 2.25 2.65 1.50 2.01 1.75 1.65 1.20 1.45 1.87 2.38 2.58 2.65 2.35 1.88 2.32
  [16] 2.39 2.20 1.05 2.00 1.28
                                   NA 1.40 1.90 1.75 1.80 2.70 2.02 1.90 1.85 1.65
   [31] 1.40 2.50 2.05 2.26 2.13 1.80 1.85 1.50 1.87 1.58 2.05 1.75 1.49 1.28 1.49
##
   [46] 1.07 1.48 1.25 1.41 1.60 1.20 1.49 1.50 1.65 1.13 1.25 1.10 2.20 1.45 1.60
   [61] 1.55 1.50 1.03 2.14 1.20 1.05 1.80 1.20 1.75 1.45 1.17 2.15 1.70 1.98 1.26
##
## [76] 1.11 1.14 1.26 1.30 1.29 1.31 1.15 1.87 1.47 1.05 2.10 1.99 1.42 1.50 1.06
## [91] 1.49 1.80 1.93 1.20 1.65 1.52 1.43 1.25 1.88 1.03 1.10 1.40 1.05 1.18 1.40
## [106] 1.37 1.32 1.55 1.30 1.24 1.50 1.65 2.17 1.28 1.07 0.67 0.68 1.87 1.35 1.75
                                   NA 1.80 2.47 2.15 1.70 1.90 1.95 1.80 1.40 1.00
## [121] 1.75 1.64 1.42
                         NA 0.90
## [136] 1.75 1.28 1.00 1.45 1.00 1.03 1.51 1.17 1.33 1.30 1.13 1.58 1.06 1.05 1.45
## [151] 1.15 1.42 1.02 1.40 1.45 1.95
                                        NΑ
```

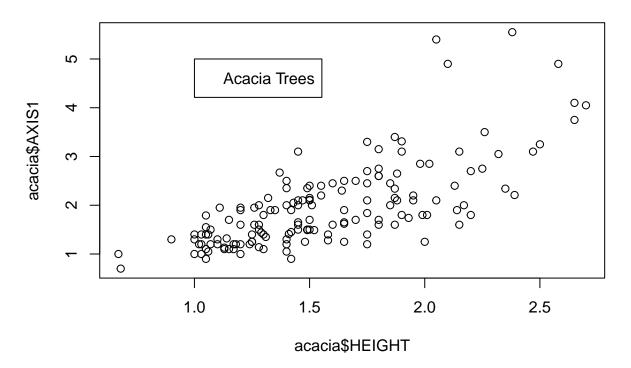
[1] TRUE

head(acacia)

```
SURVEY YEAR SITE BLOCK TREATMENT
                                    PLOT
                                          ID HEIGHT AXIS1 AXIS2 CIRC
        1 2012 SOUTH 1
## 1
                            TOTAL S1TOTAL 581
                                               2.25 2.75 2.15
                                                                20
                            TOTAL S1TOTAL 582
## 2
        1 2012 SOUTH
                       1
                                               2.65 4.10 3.90
                                                                28
## 3
        1 2012 SOUTH 1
                            TOTAL S1TOTAL 3111 1.50 1.70 0.85
                                                                17
## 4
        1 2012 SOUTH 1
                            TOTAL S1TOTAL 3112 2.01 1.80 1.60
                                                                12
                    1
1
                            TOTAL S1TOTAL 3113 1.75 1.84 1.42
## 5
        1 2012 SOUTH
                                                                13
        1 2012 SOUTH
                            TOTAL S1TOTAL 3114 1.65 1.62 0.85
## 6
                                                                15
## FLOWERS BUDS FRUITS ANT
## 1
       0
             0
                   10 CS
         0
                  150 TP
## 2
             0
## 3
         2
             1
                   50 TP
## 4
         0
                   75 CS
            0
## 5
         0
             0
                   20 CS
## 6
         0
                   0
                      Ε
             0
```

```
plot(x = acacia$HEIGHT, y = acacia$AXIS1, main = "Acacia height vs Axis")
legend(x = 1, y = 5, legend = "Acacia Trees")
```

Acacia height vs Axis

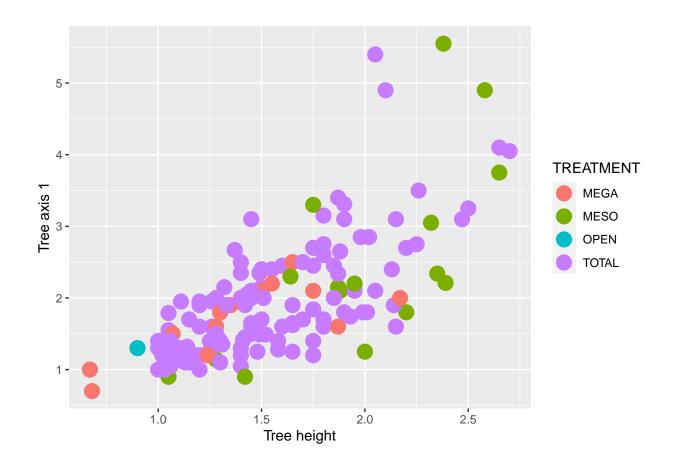


With GGplot, we create layers

```
library(ggplot2)

ggplot(data = acacia, mapping = aes(x = HEIGHT, y = AXIS1, color = TREATMENT)) +
  geom_point(size = 5) +
  labs(x = "Tree height", y = "Tree axis 1")
```

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



THE DEAL WITH THIS EXPERIMENT:

How does excluding certain classes of animals change tree height in an area?

MEASURED VARIABLES:

Variables measured include plot number, height, rainfall, circumference, flowers, buds, fruit, and ants.

WHAT HAPPENED TO THE OPEN PLOTS?:

Open plots tended to have low tree heights, maybe because of all the grazing that happened

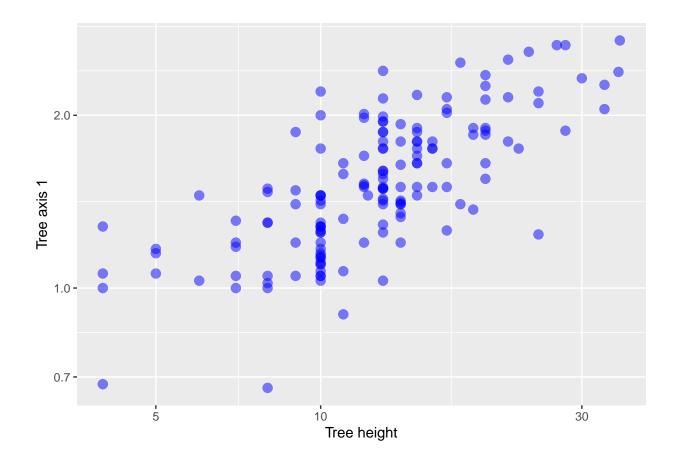
DAY TWO

Axis scale transforms

```
library(ggplot2)

ggplot(data = acacia, mapping = aes(x = CIRC, y = HEIGHT)) +
  geom_point(size = 3, color = "blue", alpha = 0.5) +
  scale_y_log10() +
  scale_x_log10() +
  labs(x = "Tree height", y = "Tree axis 1")
```

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



Fitting linear models

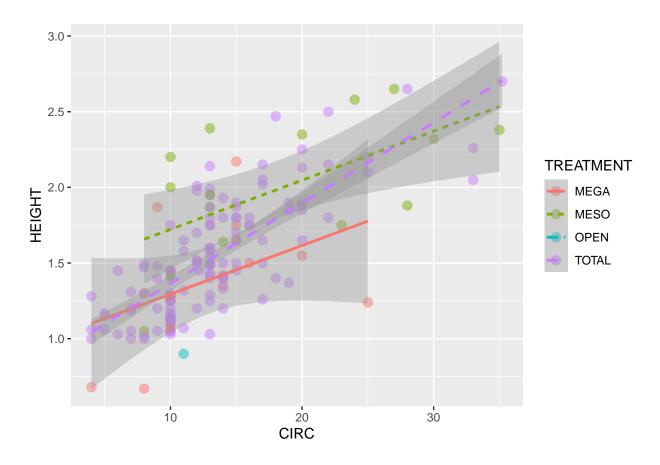
```
library(ggplot2)

ggplot(data = acacia, mapping = aes(x = CIRC, y = HEIGHT, color = TREATMENT, linetype = TREATMENT)) +
    geom_point(size = 3, alpha = 0.5) +
    geom_smooth(method = "glm")

## 'geom_smooth()' using formula = 'y ~ x'

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

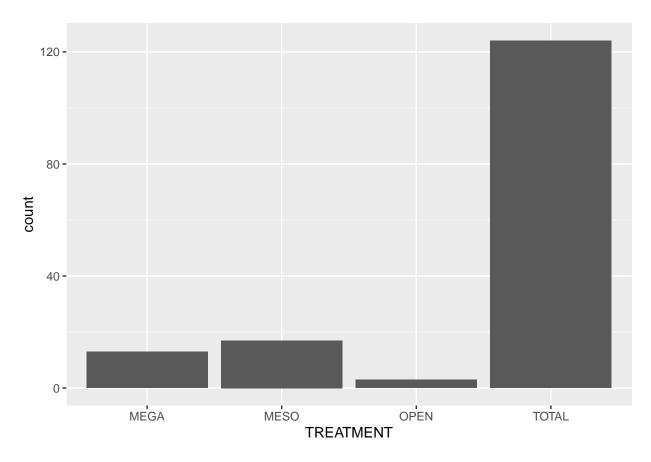
Warning: Removed 4 rows containing missing values ('geom_point()').



Histograms and Bar Plots

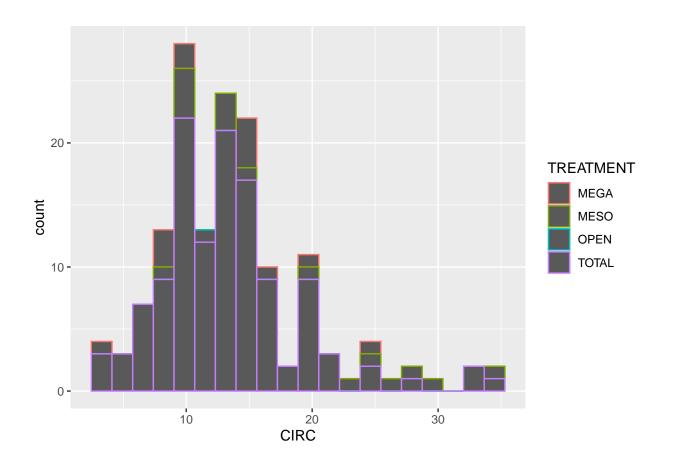
```
library(ggplot2)

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

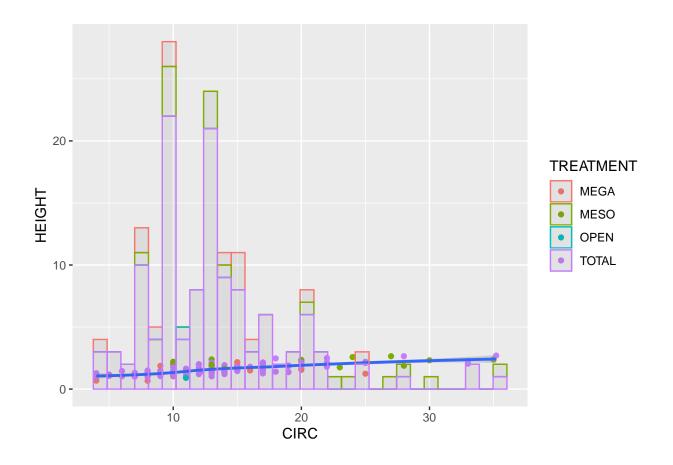


```
library(ggplot2)
ggplot(data = acacia, mapping = aes(x = CIRC, color = TREATMENT)) +
  geom_histogram(bins = 20)
```

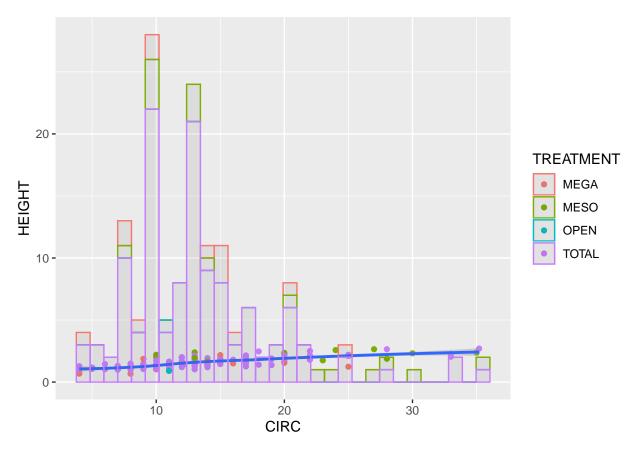
Warning: Removed 4 rows containing non-finite values ('stat_bin()').



Layering multiple data



Layering multiple data



```
library(ggplot2)
ggsave("acacia_by_treatment.jpg")
```

```
## 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()').

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

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

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