UHURU data set visualization

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A tip for working with Rmarkdown

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

```
getwd()
```

[1] "/Users/davindersingh/Downloads/datasceince2023/documents"

Note: remember that working directories in a project and 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 a data set in TSV format. This is a "tab separted values" file. To read it into R we use the function read.csv() with the sep = argument set to "\t" which represents a tab in computer language.

```
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
                                                      581
                                                                   2.75
                                                                          2.15 20.0
                               1
                                                             2.25
## 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
             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
                                                                               9.0
             1 2012 SOUTH
                                      TOTAL S1TOTAL 3199
                                                                   2.00
## 8
                               1
                                                             1.45
                                                                          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
             1 2012 SOUTH
## 12
                               1
                                       MES<sub>0</sub>
                                             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
                                                             2.39
             1 2012 SOUTH
                                       MES<sub>0</sub>
                                             S1MESO 3117
                                                                          2.10 13.0
## 16
                                                                   2.21
```

##	17	1	2012	SOUTH	1	MESO	S1MESO	3118	2.2	1.80	1.50 10.0
##				SOUTH	1	MESO	S1MESO		1.05	0.90	0.55 8.0
##				SOUTH	1	MESO	S1MESO		2	1.25	1.20 10.0
##				SOUTH	1	MESO	S1MESO		1.28	1.14	1.00 10.0
##				SOUTH	2	OPEN	S20PEN	341	dead	NA	NA NA
##				SOUTH	2		S2TOTAL		1.4	2.50	2.15 18.0
##				SOUTH	2		S2TOTAL	101	1.9	3.31	2.65 15.0
##				SOUTH	2		S2TOTAL	102	1.75	2.70	2.55 16.0
##				SOUTH	2		S2TOTAL	103	1.8	2.75	2.30 16.0
##				SOUTH	2		S2TOTAL	104	2.7	4.05	4.00 35.2
##				SOUTH	2	_	S2TOTAL	105	2.02	2.85	1.49 17.0
##	28			SOUTH	2		S2TOTAL	108	1.9	3.10	2.85 19.0
##				SOUTH	2		S2TOTAL	109	1.85	2.45	1.90 19.0
##				SOUTH	2		S2TOTAL	110	1.65	1.90	1.54 17.0
##				SOUTH	2		S2TOTAL	111	1.4	2.35	1.45 14.0
##				SOUTH	2		S2TOTAL	113	2.5	3.25	2.30 22.0
##				SOUTH	2		S2TOTAL	115	2.05	5.40	4.50 33.0
##				SOUTH	2		S2TOTAL	116	2.26	3.50	3.10 33.0
##				SOUTH	2		S2TOTAL	117	2.13	2.40	2.30 20.0
##				SOUTH	2		S2TOTAL	118	1.8	3.15	2.55 22.0
##				SOUTH	2		S2TOTAL		1.85	2.00	2.27 20.0
##				SOUTH	2		S2TOTAL		1.5	2.15	1.80 15.0
##				SOUTH	2		S2TOTAL		1.87	2.34	2.05 13.0
##				SOUTH	2		S2TOTAL		1.58	1.28	0.75 11.0
##				SOUTH	2		S2TOTAL		2.05	2.10	1.75 17.0
##				SOUTH	2		S2TOTAL		1.75	2.45	3.28 16.0
##				SOUTH	2		S2TOTAL		1.49	1.50	1.45 13.0
##				SOUTH	2		S2TOTAL		1.28	2.00	0.90 10.0
##	45			SOUTH	2		S2TOTAL		1.49	2.35	1.65 13.0
##				SOUTH	2		S2TOTAL		1.07	1.20	0.95 11.0
##				SOUTH	2		S2TOTAL		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	
##	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	S2T0TAL	1259	1.2	1.90	1.65 12.0
##	66	1	2012	SOUTH	2	TOTAL	S2T0TAL	1260	1.05	1.10	1.00 9.0
##	67	1	2012	SOUTH	2	TOTAL	S2T0TAL	2131	1.8	2.60	2.40 15.0
##	68	1	2012	SOUTH	2	TOTAL	S2T0TAL	2132	1.2	1.00	0.95 7.0
##	69	1	2012	SOUTH	2	TOTAL	S2T0TAL	2133	1.75	1.40	1.10 10.0
##	70	1	2012	SOUTH	2	TOTAL	S2T0TAL	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
##				SOUTH	2	_	S2TOTAL		2.15	3.10	2.58 22.0
##				SOUTH	2		S2TOTAL		1.7	1.70	1.40 12.0
##				SOUTH	2		S2TOTAL		1.98	2.85	2.70 12.0
##				SOUTH	2		S2TOTAL		1.26	1.95	1.75 17.0
##				SOUTH	2		S2TOTAL		1.11	1.95	1.50 10.0
##				SOUTH	2		S2TOTAL		1.14	1.32	1.05 10.0
##				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		1.42	2.11	1.75 12.0
##				SOUTH	2		S2TOTAL				0.85 4.0
##				SOUTH	2		S2TOTAL		1.06	1.05 1.50	1.15 13.0
##				SOUTH	2		S2TOTAL		1.49		1.15 13.0
##							S2TOTAL		1.8	1.60	
				SOUTH SOUTH	2		S2TOTAL		1.93	1.74	1.20 14.0 1.30 10.0
##		_		SOUTH	2		S2TOTAL		1.2	1.60	
##				SOUTH	2		S2TOTAL		1.65	1.25	1.10 11.0
##					2				1.52	1.49	1.10 12.0
##				SOUTH	2		S2TOTAL		1.43	2.05	1.54 13.0
##				SOUTH	2		S2TOTAL		1.25	1.40	1.25 13.0
##				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		1.3	1.80	0.90 8.0
	110			SOUTH	2	MEGA			1.24	1.20	1.20 25.0
	111			SOUTH	2	MEGA	S2MEGA		1.5	2.10	1.75 16.0
	112			SOUTH	2	MEGA	S2MEGA		1.65	2.50	2.20 15.0
	113			SOUTH	2	MEGA	S2MEGA		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	S2MES0	463	1.64	2.30	2.00 14.0
	123			SOUTH	2	MESO	S2MESO		1.42	0.90	0.80 10.0
##	124	1	2012	SOUTH	3	OPEN	S30PEN	1301	dead	NA	NA NA

```
1 2012 SOUTH
## 125
                                     OPEN S30PEN 1302
                                                          0.9 1.30 1.10 11.0
## 126
            1 2012 SOUTH
                             3
                                    TOTAL S3TOTAL 1061
                                                          dead
                                                                  NA
                                                                        NΑ
                                                                             NΑ
## 127
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 1062
                                                          1.8 2.60
                                                                      2.60 15.0
## 128
            1 2012 SOUTH
                                    TOTAL S3TOTAL 1063
                                                          2.47 3.10
                                                                      2.20 18.0
                             3
## 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
            1 2012 SOUTH
                                    TOTAL S3TOTAL 1067
                                                          1.95 2.10 1.90 13.0
## 132
                              3
## 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
                                    TOTAL S3TOTAL 2139
## 136
            1 2012 SOUTH
                              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
                                    TOTAL S3TOTAL 2151
                                                                      1.20 4.0
                                                          1 1.40
## 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
                                                               1.10 0.90 10.0
## 143
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2156
                                                          1.17
## 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
            1 2012 SOUTH
                                    TOTAL S3TOTAL 2160
## 147
                                                          1.58 1.40
                                                                      1.40 13.0
                              3
## 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
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2175
## 152
                                                          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
                                     MESO S3MESO 1422
## 157
            1 2012 SOUTH
                              3
                                                          dead
                                                                  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
                               F.
## 7
                         0
             0
                  0
                               CS
## 8
             0
                  0
                         25
                               CS
## 9
             0
                  0
                         0
                               TP
## 10
                         50
             0
                  0
                               TP
## 11
             0
                  0
                         5
                               CS
## 12
                  0
                         60
                               TP
             0
## 13
             0
                  0
                         60
                               TP
## 14
             2
                         60
                  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
##	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 32	0	0	0	CS
##		0	0	35	TP
##	33	0	0	300	CM CS
##	34	2	2	100	
## ##	35 36	0	0 0	30 50	CM TP
##	37	0	0	10	CM
##	38	0	0	25	CM
##	39	0	0	25 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	Ö	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
## 101	0	0	0	CS
## 102	0	0	0	CM
## 103	0	0	0	TP
## 104	0	0	30	CS
## 105	0	0	50	TP
## 100	0	0	10	CS
## 107	0	0	0	CS
## 100	0	0	15	CS
## 109 ## 110	0	0	10	CS
## 110	5	0	200	CS
## 111 ## 112	0	0	80	CS
## 112	0	0	150	TP
## 113 ## 114	0	0	40	TP
## 114	0	0	60	
## 115 ## 116	0	0	0	TP CS
## 117 ## 118	0	0	0 40	TP CS
	0	0	20	CS
## 119 ## 120	0	0	20 75	TP
## 121 ## 122	0	0	20	CM
## 122	0	0	0	TP
## 123	0	0	0	E
## 124	NA	NA	NA	mr.
## 125	O	0	0	TP
## 126	NA	NA	NA	mr.
## 127	0	0	50	TP
## 128	0	0	0	TP

```
TP
## 129
              0
                    0
                           0
## 130
              0
                    0
                           2
                                 TP
## 131
                    0
                           25
                                 TP
## 132
                    0
                           0
                                 ΤP
              0
## 133
              0
                    0
                           0
                                 TP
## 134
              0
                    0
                           0
                                 TP
## 135
              0
                    0
                           0
                                 TP
                           0
## 136
              0
                    0
                                 TP
## 137
              0
                   0
                           0
                                 TP
## 138
              0
                    0
                           0
                                 TP
## 139
              0
                    0
                           0
                                 TP
                           0
                                 TP
## 140
              0
                    0
                    0
                           0
                                 TP
## 141
              0
## 142
              0
                    0
                           0
                                 ΤP
## 143
              0
                    0
                           0
                                 TP
## 144
              0
                    0
                           0
                                 TP
## 145
              0
                   0
                           0
                                 TP
## 146
                    0
                           0
                                 TP
## 147
              0
                   0
                           0
                                 TP
## 148
              0
                    0
                           8
                                 TP
## 149
              0
                    0
                           0
                                 TP
## 150
                    0
                           0
                                 TP
## 151
              0
                   0
                           0
                                 TP
## 152
              0
                   0
                           0
                                 TP
## 153
                   0
                           0
                                 TP
              0
## 154
              0
                    0
                           0
                                 TP
## 155
              0
                    0
                          20
                                 ΤP
## 156
              0
                    0
                           2
                                 CS
## 157
             NA
                  NA
                          NA
```

Assign the data to a varibale so we can work with it

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

3. Acessing elements of a data.frame

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
          1 2012 SOUTH
## 2
                                 TOTAL S1TOTAL 582
                                                      2.65 4.10 3.90
                                                                          28
                           1
          1 2012 SOUTH
## 3
                           1
                                 TOTAL S1TOTAL 3111
                                                       1.5 1.70 0.85
                                                                          17
## 4
          1 2012 SOUTH
                                 TOTAL S1TOTAL 3112
                                                      2.01 1.80 1.60
                                                                          12
## 5
          1 2012 SOUTH
                                 TOTAL S1TOTAL 3113
                                                      1.75 1.84 1.42
                                                                          13
                           1
## 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
                          TP
                     150
## 3
           2
                1
                      50
                          TP
## 4
                      75 CS
           0
                0
## 5
           0
                0
                      20 CS
## 6
           0
                0
                       0
                           Ε
```

str(acacia)

```
## 'data.frame': 157 obs. of 15 variables:
   $ SURVEY : int 1 1 1 1 1 1 1 1 1 ...
                  $ YEAR
             : int
            : chr "SOUTH" "SOUTH" "SOUTH" ...
## $ SITE
## $ BLOCK : int 1 1 1 1 1 1 1 1 1 ...
## $ TREATMENT: chr "TOTAL" "TOTAL" "TOTAL" "TOTAL" ...
            : chr "S1TOTAL" "S1TOTAL" "S1TOTAL" "S1TOTAL" ...
##
   $ PLOT
            : int 581 582 3111 3112 3113 3114 3115 3199 941 942 ...
## $ ID
## $ HEIGHT : chr "2.25" "2.65" "1.5" "2.01" ...
            : num 2.75 4.1 1.7 1.8 1.84 1.62 1.95 2 2.15 5.55 ...
## $ AXIS1
          : num 2.15 3.9 0.85 1.6 1.42 0.85 0.9 1.75 1.82 4.82 ...
## $ AXIS2
           : num 20 28 17 12 13 15 9 12.2 13 35 ...
## $ CIRC
## $ FLOWERS : int 0 0 2 0 0 0 0 0 0 ...
## $ BUDS
            : int 0010000000...
## $ FRUITS
           : int 10 150 50 75 20 0 0 25 0 50 ...
            : chr "CS" "TP" "TP" "CS" ...
## $ ANT
```

It is similar to what we do for vectors, but we have two dimensions

acacia[,6]

```
[1] "S1TOTAL" "S1TOTAL" "S1TOTAL" "S1TOTAL" "S1TOTAL" "S1TOTAL"
##
    [8] "S1TOTAL" "S1MESO" "S1MESO" "S1MESO" "S1MESO" "S1MESO" "S1MESO"
##
   [15] "S1MESO" "S1MESO" "S1MESO" "S1MESO" "S1MESO" "S1MESO" "S2OPEN"
##
   [22] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
   [29] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
##
   [36] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
##
   [43] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
##
   [50] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
##
   [57] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
##
   [64] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
##
   [71] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
   [78] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
##
   [85] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
   [92] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
  [99] "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL" "S2TOTAL"
## [106] "S2TOTAL" "S2TOTAL" "S2MEGA"
                                   "S2MEGA" "S2MEGA" "S2MEGA" "S2MEGA"
## [113] "S2MEGA" "S2MEGA" "S2MEGA"
                                   "S2MEGA" "S2MEGA" "S2MEGA" "S2MEGA"
## [120] "S2MEGA" "S2MESO" "S2MESO" "S3OPEN" "S3OPEN" "S3TOTAL"
## [127] "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL"
## [134] "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL"
## [141] "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL"
## [148] "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL" "S3TOTAL"
## [155] "S3TOTAL" "S3MESO" "S3MESO"
```

str(acacia)

```
$ SITE
              : chr "SOUTH" "SOUTH" "SOUTH" ...
   $ BLOCK
##
             : int 1 1 1 1 1 1 1 1 1 ...
  $ TREATMENT: chr
                    "TOTAL" "TOTAL" "TOTAL" "TOTAL" ...
              : chr "S1TOTAL" "S1TOTAL" "S1TOTAL" ...
  $ PLOT
##
   $ TD
              : int 581 582 3111 3112 3113 3114 3115 3199 941 942 ...
  $ HEIGHT : chr "2.25" "2.65" "1.5" "2.01" ...
##
             : num 2.75 4.1 1.7 1.8 1.84 1.62 1.95 2 2.15 5.55 ...
  $ AXIS1
              : num 2.15 3.9 0.85 1.6 1.42 0.85 0.9 1.75 1.82 4.82 ...
##
   $ AXIS2
##
   $ CIRC
              : num 20 28 17 12 13 15 9 12.2 13 35 ...
## $ FLOWERS : int 0 0 2 0 0 0 0 0 0 ...
  $ BUDS
              : int 001000000...
              : int 10 150 50 75 20 0 0 25 0 50 ...
##
   $ FRUITS
                   "CS" "TP" "TP" "CS" ...
   $ ANT
              : chr
```

All are the following ways to accessing a column or variable in data

```
acacia$SURVEY
## [149] 1 1 1 1 1 1 1 1 1
acacia[, 1]
## [149] 1 1 1 1 1 1 1 1 1
acacia[, "SURVEY"]
## [149] 1 1 1 1 1 1 1 1 1
```

Replacing elements in a data frame

4. quality control

```
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
                                TOTAL S1TOTAL 582
                                                     2.65 4.10 3.90
                                                                        28
                          1
```

```
## 3
          1 2012 SOUTH
                                  TOTAL S1TOTAL 3111
                                                        1.5 1.70 0.85
                                                                           17
                           1
                                  TOTAL S1TOTAL 3112
## 4
          1 2012 SOUTH
                                                                           12
                                                       2.01 1.80 1.60
                            1
          1 2012 SOUTH
                            1
                                  TOTAL S1TOTAL 3113
                                                       1.75 1.84 1.42
                                                                           13
          1 2012 SOUTH
                                  TOTAL S1TOTAL 3114
## 6
                                                        1.65 1.62 0.85
                                                                           15
                            1
    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
                           Ε
```

str(acacia)

```
## 'data.frame':
                 157 obs. of 15 variables:
   $ SURVEY
            : int 1 1 1 1 1 1 1 1 1 1 ...
   $ YEAR
             : int
                   : chr
                   "SOUTH" "SOUTH" "SOUTH" ...
##
   $ SITE
   $ BLOCK
             : int
                  1 1 1 1 1 1 1 1 1 1 ...
   $ TREATMENT: chr
                   "TOTAL" "TOTAL" "TOTAL" ...
##
   $ PLOT
            : chr
                   "S1TOTAL" "S1TOTAL" "S1TOTAL" "S1TOTAL" ...
             : int 581 582 3111 3112 3113 3114 3115 3199 941 942 ...
##
   $ ID
   $ HEIGHT
            : chr "2.25" "2.65" "1.5" "2.01" ...
##
   $ AXIS1
             : num 2.75 4.1 1.7 1.8 1.84 1.62 1.95 2 2.15 5.55 ...
             : num 2.15 3.9 0.85 1.6 1.42 0.85 0.9 1.75 1.82 4.82 ...
##
   $ AXIS2
             : num 20 28 17 12 13 15 9 12.2 13 35 ...
##
   $ CIRC
   $ FLOWERS : int 0 0 2 0 0 0 0 0 0 0 ...
             : int 0010000000...
   $ BUDS
   $ FRUITS
             : int 10 150 50 75 20 0 0 25 0 50 ...
             : chr "CS" "TP" "TP" "CS" ...
   $ ANT
```

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
## 3
            1 2012 SOUTH
                            1
                                  TOTAL S1TOTAL 3111
                                                        1.5 1.70 0.85 17.0
            1 2012 SOUTH
                                  TOTAL S1TOTAL 3112
                                                       2.01 1.80 1.60 12.0
## 4
                            1
## 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
                                  TOTAL S1TOTAL 3115
                                                        1.2 1.95 0.90 9.0
                            1
            1 2012 SOUTH
                                                       1.45 2.00 1.75 12.2
## 8
                            1
                                  TOTAL S1TOTAL 3199
                                                       1.87 2.15 1.82 13.0
## 9
            1 2012 SOUTH
                                   MESO S1MESO 941
                            1
## 10
            1 2012 SOUTH
                            1
                                   MESO
                                         S1MESO
                                                 942
                                                       2.38 5.55
                                                                  4.82 35.0
            1 2012 SOUTH
                                   MESO
                                         S1MESO
                                                       2.58 4.90 4.24 24.0
## 11
                            1
                                                 943
## 12
            1 2012 SOUTH
                                   MESO
                                         S1MESO
                                                 944
                                                       2.65
                                                            3.75
                                                                   3.10 27.0
                            1
                                                       2.35 2.34 2.05 20.0
## 13
            1 2012 SOUTH
                                   MESO
                                         S1MESO 946
                            1
            1 2012 SOUTH
                                   MESO
                                         S1MESO 947
                                                       1.88 2.10 1.85 28.0
## 14
                            1
            1 2012 SOUTH
## 15
                            1
                                   MESO 
                                         S1MESO 3116
                                                       2.32 3.05 2.63 30.0
            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
           1 2012 SOUTH
## 18
                            1
                                   MESO.
                                         S1MESO 3119
                                                       1.05 0.90 0.55 8.0
           1 2012 SOUTH
                                                          2 1.25 1.20 10.0
## 19
                                   MESO
                                         S1MESO 3120
                            1
```

##	20	1	2012	SOUTH	1	MESO	S1MESO	3131	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	S2TOTAL	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	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			SOUTH	2		S2TOTAL		1.85	2.00	2.27	
##				SOUTH	2		S2TOTAL		1.5	2.15		15.0
##				SOUTH	2	_	S2T0TAL		1.87	2.34	2.05	
	40			SOUTH	2		S2TOTAL		1.58	1.28	0.75	
	41			SOUTH	2		S2T0TAL		2.05	2.10		17.0
	42			SOUTH	2		S2T0TAL		1.75	2.45	3.28	
	43			SOUTH	2		S2TOTAL		1.49	1.50		13.0
	44			SOUTH	2		S2TOTAL		1.28	2.00	0.90	
	45			SOUTH	2		S2TOTAL		1.49	2.35		13.0
##				SOUTH	2		S2TOTAL		1.07	1.20	0.95	
	47			SOUTH	2		S2TOTAL		1.48	1.25	1.20	9.0
##				SOUTH	2		S2TOTAL		1.25	1.25	0.90	
	49 50			SOUTH	2 2		S2TOTAL S2TOTAL		1.41 1.6	1.41 1.60		14.0 13.0
	51			SOUTH	2		S2TOTAL		1.0	1.20		14.0
	52			SOUTH	2		S2TOTAL		1.49	1.49	1.20	8.0
	53			SOUTH	2		S2TOTAL		1.43	1.50		14.0
	54			SOUTH	2		S2TOTAL		1.65	1.65	2.00	
	55			SOUTH	2		S2TOTAL		1.13	1.13		10.0
	56			SOUTH	2		S2TOTAL		1.25	1.25	0.90	
##				SOUTH	2		S2TOTAL		1.1	1.20		10.0
	58			SOUTH	2		S2TOTAL			2.70	2.40	
	59			SOUTH	2		S2T0TAL			1.65		10.0
	60			SOUTH	2		S2T0TAL		1.6	2.45		13.0
##	61			SOUTH	2		S2TOTAL		1.55	2.40	1.80	13.0
##	62			SOUTH	2		S2TOTAL		1.5	2.40		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	S2T0TAL	2133	1.75	1.40	1.10	10.0
	70			SOUTH	2		S2T0TAL			3.10		10.0
	71			SOUTH	2		S2T0TAL			1.20		5.0
	72			SOUTH	2		S2T0TAL			3.10	2.58	
##	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
##				SOUTH	2	_	S2TOTAL		1.26	1.95		17.0
##	76			SOUTH	2		S2TOTAL		1.11	1.95		10.0
##				SOUTH	2		S2TOTAL		1.14	1.32	1.05	
##				SOUTH	2		S2TOTAL		1.26	1.60	1.40	
##				SOUTH	2		S2TOTAL		1.3	1.40	0.80	
##				SOUTH	2		S2TOTAL		1.29	1.44	1.35	
##				SOUTH	2		S2TOTAL		1.31	1.35	1.15	7.0
##				SOUTH	2		S2TOTAL		1.15	1.70	1.28	
##				SOUTH	2		S2TOTAL		1.87	3.40	1.85	
##				SOUTH	2		S2TOTAL		1.47	2.10	1.61	8.0
##				SOUTH	2		S2TOTAL			1.79	1.50	
##				SOUTH	2		S2TOTAL		1.05 2.1	4.90	3.75	
				SOUTH			S2TOTAL S2TOTAL					
##					2				1.99	1.80	1.35	
##				SOUTH	2		S2TOTAL		1.42	1.90	1.80	
##				SOUTH	2		S2TOTAL		1.5	2.11	1.75	
##				SOUTH	2		S2TOTAL		1.06	1.05	0.85	4.0
##				SOUTH	2		S2TOTAL		1.49	1.50	1.15	
##				SOUTH	2	_	S2TOTAL		1.8	1.60	1.50	
##				SOUTH	2	_	S2T0TAL		1.93	1.74	1.20	
##				SOUTH	2		S2TOTAL		1.2	1.60	1.30	
##	95	1	2012	SOUTH	2		S2TOTAL		1.65	1.25	1.10	
##	96	1	2012	SOUTH	2		S2T0TAL		1.52	1.49	1.10	12.0
##	97	1	2012	SOUTH	2		S2TOTAL		1.43	2.05	1.54	13.0
##	98	1	2012	SOUTH	2		S2TOTAL		1.25	1.40	1.25	13.0
##	99	1	2012	SOUTH	2	TOTAL	S2T0TAL	3177	1.88	2.65	2.64	20.0
##	100	1	2012	SOUTH	2	TOTAL	S2T0TAL	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			SOUTH	2	MEGA	S2MEGA	186	1.65	2.50	2.20	
	113			SOUTH	2	MEGA	S2MEGA		2.17	2.00	1.20	
	114			SOUTH	2	MEGA	S2MEGA	188	1.28	1.60	1.50	
	115			SOUTH	2	MEGA	S2MEGA	189	1.07	1.50	1.50	
	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	192	1.87	1.60	1.40	9.0
	119			SOUTH	2	MEGA	S2MEGA	193	1.35	1.90	1.50	
	120			SOUTH	2	MEGA	S2MEGA		1.75	2.10	2.10	
	121			SOUTH	2	MESO	S2MESO		1.75	3.30	2.50	
	121			SOUTH	2	MESO	S2MESO	463	1.64	2.30	2.00	
	123			SOUTH	2	MESO	S2MESO S2MESO		1.42	0.90	0.80	
	123			SOUTH	3							
					3	OPEN	S30PEN		dead 0 0	NA 1 30	NA 1 10	NA 11 O
	125			SOUTH		OPEN	S30PEN		0.9	1.30	1.10	
	126			SOUTH	3		SSTOTAL		dead	NA	NA	NA 15.0
##	127	Τ	2012	SOUTH	3	IUIAL	S3TOTAL	1002	1.8	2.60	2.60	15.0

```
1 2012 SOUTH
## 128
                              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
                                    TOTAL S3TOTAL 1066
                              3
                                                            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
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 1069
                                                            1.4 2.00
                                                                       1.60 14.0
## 134
            1 2012 SOUTH
                                    TOTAL S3TOTAL 1070
                                                                       1.20 7.0
## 135
                              3
                                                              1
                                                                1.30
## 136
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2139
                                                           1.75
                                                                 1.20
                                                                       1.10 13.0
            1 2012 SOUTH
                              3
                                                           1.28
                                                                       0.95 4.0
## 137
                                    TOTAL S3TOTAL 2140
                                                                1.50
## 138
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2151
                                                              1 1.40
                                                                       1.20 4.0
## 139
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2152
                                                                 1.50
                                                                       1.30 10.0
                                                           1.45
## 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
                                                                       0.90 6.0
                                                                1.00
## 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
                                    TOTAL S3TOTAL 2159
                                                                       0.90 10.0
                              3
                                                           1.13 1.10
## 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
            1 2012 SOUTH
## 150
                                    TOTAL S3TOTAL 2173
                                                           1.45 1.60
                                                                       1.10
                                                                              6.0
                              3
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2174
                                                           1.15
                                                                 1.10
                                                                       0.90
## 151
                                                                              5.0
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2175
                                                                       1.30 13.0
## 152
                                                           1.42 1.45
## 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
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2178
## 155
                                                           1.45
                                                                 2.10
                                                                       2.05 15.0
## 156
            1 2012 SOUTH
                              3
                                     MESO
                                           S3MESO 1421
                                                           1.95
                                                                2.20
                                                                       1.60 13.0
                                                           dead
## 157
            1 2012 SOUTH
                              3
                                     MESO
                                            S3MESO 1422
                                                                   NA
                                                                          NA
                                                                               NA
       FLOWERS BUDS FRUITS
##
                              ANT
## 1
             0
                  0
                         10
                               CS
## 2
             0
                   0
                        150
                               TP
## 3
                         50
                               TP
             2
                   1
## 4
             0
                  0
                         75
                               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
             0
                  0
                               TP
## 11
             0
                  0
                          5
                               CS
## 12
             0
                  0
                         60
                               TP
## 13
             0
                  0
                         60
                               TP
## 14
             2
                  0
                         60
                               CS
## 15
             2
                          0
                               CS
                  0
## 16
             0
                  0
                          0
                               TP
                               TP
## 17
             0
                  0
                          0
## 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 CN
##	55	0	0	0	
##	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	Ε
## 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
                                TP
## 133
                   0
                                TР
              0
                           0
## 134
                   0
                           0
                                TP
## 135
                                TP
                   0
                           0
              0
## 136
              0
                   0
                           0
                                TP
## 137
                           0
                                TP
              0
                   0
## 138
                                TP
                   0
## 139
                                TP
              0
                   0
                           0
## 140
              0
                   0
                           0
                                TP
## 141
                           0
                                TP
              0
                   0
## 142
              0
                   0
                           0
                                TP
                                TP
## 143
                   0
                           0
              0
                                TP
## 144
              0
                   0
                           0
## 145
                                ΤP
              0
                   0
                           0
## 146
              0
                   0
                           0
                                TP
## 147
              0
                   0
                           0
                                TP
## 148
                   0
                                TP
              Ω
                           8
## 149
                   0
                           0
                                TP
## 150
                           0
                                TP
              0
                   0
## 151
              0
                   0
                           0
                                TP
## 152
              0
                   0
                           0
                                TP
## 153
                   0
                           0
                                TP
## 154
                           0
                                TP
              0
                   0
## 155
                          20
                                TP
                   0
## 156
                           2
                                CS
              0
                   0
## 157
            NA
                  NA
                          NA
```

class(acacia\$HEIGHT)

[1] "character"

is.numeric(acacia\$HEIGHT)

[1] FALSE

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"
                                         "1.75" "1.28" "1"
## [131] "1.9" "1.95" "1.8" "1.4" "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
```

We identified that HEIGHT should be numeric and is instead character:

```
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
## [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
```

Coercion in R computer language ,eams tjat a va;ie was forced to be a type, in this case, the word "DEAD" cannot be transformed to a number, so it is assigned the NA value

```
SURVEY YEAR SITE BLOCK TREATMENT
                                           PLOT
                                                  ID HEIGHT AXIS1 AXIS2 CIRC
##
                                  TOTAL S1TOTAL
## 1
            1 2012 SOUTH
                            1
                                                 581
                                                        2.25
                                                             2.75
                                                                   2.15 20.0
## 2
            1 2012 SOUTH
                                  TOTAL S1TOTAL 582
                            1
                                                       2.65
                                                             4.10 3.90 28.0
## 3
           1 2012 SOUTH
                            1
                                  TOTAL S1TOTAL 3111
                                                       1.50 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
                                  TOTAL S1TOTAL 3113
                            1
                                                       1.75 1.84
                                                                   1.42 13.0
                                  TOTAL S1TOTAL 3114
## 6
           1 2012 SOUTH
                                                       1.65 1.62 0.85 15.0
```

##	7	1	2012	SOUTH	1	TOTAL	S1TOTAL	3115	1.20	1.95	0.90 9.0
##				SOUTH	1		S1TOTAL		1.45	2.00	1.75 12.2
##	9			SOUTH	1	MESO	S1MESO	941	1.87	2.15	1.82 13.0
##				SOUTH	1	MESO	S1MESO	942	2.38	5.55	4.82 35.0
	11			SOUTH	1	MESO	S1MESO	943	2.58	4.90	4.24 24.0
	12			SOUTH	1	MESO	S1MESO	944	2.65	3.75	3.10 27.0
	13			SOUTH	1	MESO	S1MESO	946	2.35	2.34	2.05 20.0
	14			SOUTH	1	MESO	S1MESO	947	1.88	2.10	1.85 28.0
	15			SOUTH	1	MESO	S1MESO		2.32	3.05	2.63 30.0
##	16			SOUTH	1	MESO	S1MESO		2.39	2.21	2.10 13.0
##	17			SOUTH	1	MESO	S1MESO	3118	2.20	1.80	1.50 10.0
##	18			SOUTH	1	MESO	S1MESO		1.05	0.90	0.55 8.0
##	19			SOUTH	1	MESO	S1MESO		2.00	1.25	1.20 10.0
##	20			SOUTH	1	MESO	S1MESO		1.28	1.14	1.00 10.0
	21			SOUTH	2	OPEN	S20PEN	341	NA	NA	NA NA
##				SOUTH	2		S2TOTAL		1.40	2.50	2.15 18.0
##				SOUTH	2		S2TOTAL	101	1.90	3.31	2.65 15.0
##				SOUTH	2		S2TOTAL	102	1.75	2.70	2.55 16.0
##	25			SOUTH	2	_	S2TOTAL	103	1.80	2.75	2.30 16.0
##	26			SOUTH	2		S2TOTAL	104	2.70	4.05	4.00 35.2
##				SOUTH	2		S2TOTAL	105	2.02	2.85	1.49 17.0
##	28	1	2012	SOUTH	2		S2TOTAL	108	1.90	3.10	2.85 19.0
##	29			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	1.40	2.35	1.45 14.0
##	32			SOUTH	2	TOTAL	S2TOTAL	113	2.50	3.25	2.30 22.0
##	33			SOUTH	2		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	1.80	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	1.50	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	1.60	1.60	1.30 13.0
##	51	1	2012	SOUTH	2	TOTAL	S2TOTAL	1235	1.20	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	1.50	1.50	1.50 14.0
##	54			SOUTH	2		S2T0TAL		1.65	1.65	2.00 20.0
##	55			SOUTH	2		S2T0TAL		1.13	1.13	1.20 10.0
##	56			SOUTH	2	TOTAL	S2T0TAL	1240	1.25	1.25	0.90 10.0
##	57	1	2012	SOUTH	2	TOTAL	S2T0TAL	1251	1.10	1.20	1.10 10.0
##	58	1	2012	SOUTH	2	TOTAL	S2T0TAL	1252		2.70	2.40 25.0
##	59			SOUTH	2		S2T0TAL			1.65	1.25 10.0
##	60	1	2012	SOUTH	2	TOTAL	S2T0TAL	1254	1.60	2.45	2.10 13.0

##	61	1	2012	SOUTH	2	TOTAL.	S2T0TAL	1255	1.55	2.40	1.80 13.0
##				SOUTH	2		S2TOTAL		1.50	2.40	2.15 13.0
##				SOUTH	2		S2TOTAL		1.03	1.20	1.00 10.0
##				SOUTH	2		S2TOTAL		2.14	1.90	1.70 13.0
##				SOUTH	2		S2TOTAL		1.20	1.90	1.65 12.0
##				SOUTH	2		S2TOTAL		1.05	1.10	1.00 9.0
##				SOUTH	2		S2TOTAL		1.80	2.60	2.40 15.0
##				SOUTH	2		S2TOTAL		1.20	1.00	0.95 7.0
##				SOUTH	2		S2TOTAL		1.75	1.40	1.10 10.0
##				SOUTH	2		S2TOTAL		1.45	3.10	1.80 10.0
##				SOUTH	2		S2TOTAL		1.17	1.20	1.10 5.0
##				SOUTH	2	_	S2TOTAL		2.15	3.10	2.58 22.0
##				SOUTH	2		S2TOTAL		1.70	1.70	1.40 12.0
##				SOUTH	2		S2TOTAL		1.98	2.85	2.70 12.0
##				SOUTH	2		S2TOTAL		1.26	1.95	1.75 17.0
##				SOUTH	2		S2TOTAL		1.11	1.95	1.50 10.0
##				SOUTH	2		S2TOTAL		1.11	1.32	1.05 10.0
##				SOUTH	2		S2TOTAL		1.14	1.60	1.40 10.0
##				SOUTH	2		S2TOTAL		1.30	1.40	0.80 10.0
##				SOUTH			S2TOTAL				
##				SOUTH	2 2		S2TOTAL		1.29	1.44	1.35 13.0 1.15 7.0
##				SOUTH	2		S2TOTAL		1.31	1.35 1.70	1.15 7.0 1.28 10.0
									1.15		
##				SOUTH	2		S2TOTAL		1.87	3.40	1.85 15.0 1.61 8.0
##				SOUTH	2		S2TOTAL		1.47	2.10	
##				SOUTH	2		S2TOTAL		1.05	1.79	1.50 10.0
##				SOUTH	2		S2TOTAL		2.10	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		1.50	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		1.80	1.60	1.50 14.0
##				SOUTH	2	_	S2TOTAL		1.93	1.74	1.20 14.0
##				SOUTH	2		S2TOTAL		1.20	1.60	1.30 10.0
##				SOUTH	2		S2TOTAL		1.65	1.25	1.10 11.0
	96			SOUTH	2		S2TOTAL		1.52	1.49	1.10 12.0
##				SOUTH	2		S2TOTAL		1.43	2.05	1.54 13.0
##				SOUTH	2		S2TOTAL		1.25	1.40	1.25 13.0
##				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		1.10	1.30	1.20 10.0
	102			SOUTH	2		S2TOTAL		1.40	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		1.40	1.30	1.85 13.0
	106			SOUTH	2		S2T0TAL		1.37	2.67	2.19 19.0
	107			SOUTH	2		S2TOTAL		1.32	2.15	1.55 11.0
	108			SOUTH	2	MEGA			1.55	2.20	1.20 20.0
	109			SOUTH	2	MEGA			1.30	1.80	0.90 8.0
	110			SOUTH	2	MEGA	S2MEGA		1.24	1.20	1.20 25.0
	111			SOUTH	2	MEGA	S2MEGA		1.50	2.10	1.75 16.0
	112			SOUTH	2	MEGA	S2MEGA		1.65	2.50	2.20 15.0
	113			SOUTH	2	MEGA	S2MEGA		2.17	2.00	1.20 15.0
##	114	1	2012	SOUTH	2	MEGA	S2MEGA	188	1.28	1.60	1.50 10.0

```
1 2012 SOUTH
## 115
                              2
                                     MEGA
                                            S2MEGA
                                                    189
                                                           1.07 1.50 1.50 10.0
## 116
            1 2012 SOUTH
                              2
                                     MEGA
                                            S2MEGA
                                                    190
                                                                1.00
                                                                       0.80 8.0
                                                          0.67
            1 2012 SOUTH
                                                                0.70
                                                                       0.60
## 117
                              2
                                     MEGA
                                            S2MEGA
                                                    191
                                                           0.68
                                                                             4.0
            1 2012 SOUTH
## 118
                              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
            1 2012 SOUTH
                              2
                                     MESO.
                                            S2MES0
## 121
                                                    462
                                                           1.75
                                                                3.30
                                                                       2.50 23.0
            1 2012 SOUTH
                              2
## 122
                                     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
                                           S30PEN 1301
                                                            NA
                                                                   NA
                                                                         NA
                                                                              NA
## 125
            1 2012 SOUTH
                              3
                                     OPEN S30PEN 1302
                                                           0.90
                                                                1.30
                                                                       1.10 11.0
## 126
            1 2012 SOUTH
                                    TOTAL S3TOTAL 1061
                                                                   NA
                              3
                                                            NA
                                                                         NA
                                                                              NA
## 127
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 1062
                                                          1.80
                                                                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
                                                           1.70
                                                                2.50
                                                                       2.15 15.0
## 131
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 1066
                                                           1.90
                                                                1.80
                                                                       1.50 20.0
## 132
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 1067
                                                           1.95
                                                                2.10
                                                                       1.90 13.0
                                                                1.70
## 133
            1 2012 SOUTH
                                    TOTAL S3TOTAL 1068
                                                                       1.40 13.0
                              3
                                                           1.80
## 134
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 1069
                                                           1.40
                                                                2.00
                                                                       1.60 14.0
            1 2012 SOUTH
                                                          1.00
## 135
                              3
                                    TOTAL S3TOTAL 1070
                                                                1.30
                                                                       1.20 7.0
## 136
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2139
                                                          1.75
                                                                1.20
                                                                       1.10 13.0
            1 2012 SOUTH
## 137
                                    TOTAL S3TOTAL 2140
                                                           1.28 1.50
                                                                       0.95 4.0
                              3
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2151
                                                          1.00
                                                                1.40
                                                                       1.20 4.0
## 138
                              3
                                    TOTAL S3TOTAL 2152
                                                           1.45 1.50
                                                                       1.30 10.0
## 139
            1 2012 SOUTH
## 140
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2153
                                                           1.00 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
                              3
                                    TOTAL S3TOTAL 2155
## 142
                                                          1.51
                                                                2.00
                                                                       1.80 12.0
## 143
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2156
                                                                1.10
                                                                       0.90 10.0
                                                          1.17
## 144
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2157
                                                           1.33 1.90
                                                                       1.85 14.0
## 145
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2158
                                                           1.30
                                                                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
                                    TOTAL S3TOTAL 2171
                                                                       1.00
                              3
                                                           1.06
                                                                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
                                                           1.40
                                                                1.20
                                                                       1.00 9.0
            1 2012 SOUTH
                              3
                                    TOTAL S3TOTAL 2178
## 155
                                                           1.45
                                                                2.10
                                                                       2.05 15.0
            1 2012 SOUTH
                              3
                                     MESO S3MESO 1421
                                                           1.95 2.20
                                                                       1.60 13.0
## 156
## 157
            1 2012 SOUTH
                              3
                                     MESO S3MESO 1422
                                                            NA
                                                                   NA
                                                                         NA
                                                                              NA
##
       FLOWERS BUDS FRUITS
                              ANT
## 1
             0
                  0
                         10
                               CS
## 2
             0
                  0
                        150
                               TP
## 3
             2
                  1
                         50
                               TP
## 4
                         75
             0
                  0
                               CS
## 5
             0
                  0
                         20
                               CS
## 6
             0
                   0
                          0
                                Ε
## 7
                  0
                          0
                               CS
             0
## 8
             0
                  0
                         25
                               CS
## 9
             0
                  0
                          0
                               TP
## 10
             0
                  0
                         50
                               TP
```

	.1	0	0	5	CS
	.2	0	0	60	TP
	.3	0	0	60	TP
	.4	2	0	60	CS
	.5	2	0	0	CS
	.6	0	0	0	TP
	.7	0	0	0	TP
	.8 .9	0	0	0	CS CM
	.9 20	0	0	0	TP
	21	NA	NA	NA	11
	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	Ö	200	CM
	30	0	0	10	CS
	31	0	0	0	CS
## 3	32	0	0	35	TP
## 3	33	0	0	300	CM
## 3	34	2	2	100	CS
## 3	35	0	0	30	CM
## 3	36	0	0	50	TP
## 3	37	0	0	10	CM
## 3	38	0	0	25	CS
## 3	39	0	0	15	TP
## 4	-0	0	0	0	TP
## 4	1	0	0	15	TP
## 4	2	0	0	0	TP
## 4	13	0	0	40	TP
## 4	4	0	0	0	TP
## 4	<u>.</u> 5	0	0	15	CM
## 4	-6	0	0	0	CM
	-7	0	0	0	TP
	18	0	0	0	TP
	<u> 1</u> 9	0	0	1	TP
	50	0	0	20	TP
	51	0	0	0	TP
	52	0	0	0	TP
	3	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 . o	0	0	5	TP
	59	0	0	0	TP
	30 31	0	0	25	TP
	51 :2	0	0	25	TP
	32	0	0	20	TP
	33 24	0	0	0	TP
## 6	34	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		AB_TP
## 75 ## 76	0	0	0	TP
## 76 ## 77	0 0	0	0 0	TP
## 77 ## 78	0	0	0	TP CS
## 79	0	0	0	CS
## 79	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 ## 103	0	0	0	CS
## 103 ## 104	0 0	0 0	0 0	CM TP
## 104	0	0	30	CS
## 105	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
                                ΤP
              0
                   0
                          75
## 121
                          20
              0
                   0
                                CM
## 122
              0
                   0
                           0
                                TP
## 123
              0
                   0
                           0
                                 Ε
## 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
                           2
                                ΤP
              0
## 131
              0
                   0
                          25
                                TP
## 132
              0
                   0
                           0
                                TP
## 133
              0
                   0
                           0
                                TP
## 134
              0
                   0
                           0
                                ΤP
## 135
              0
                   0
                           0
                                TP
## 136
                   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
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                           0
                                TP
## 143
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              0
                   0
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## 144
              0
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                           0
                                TP
## 145
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                   0
                           0
                                TP
## 146
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                                ΤP
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                                TP
## 147
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                   0
## 148
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## 149
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                                TP
## 150
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                                TP
## 151
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                                TP
                           0
                                TP
## 152
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## 153
                           0
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## 154
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                                TP
              0
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## 155
              0
                   0
                          20
                                TP
## 156
              0
                   0
                           2
                                CS
## 157
             NA
                  NA
                          NA
```

is.numeric(acacia\$HEIGHT)

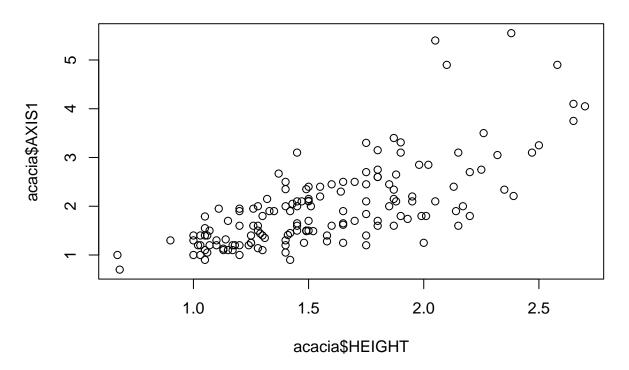
[1] TRUE

5. Plotting data with ggplot2

Regular way to plot in R

```
plot(x = acacia$HEIGHT, y = acacia$AXIS1, main = "Acacia height vs axis1")
```

Acacia height vs axis1



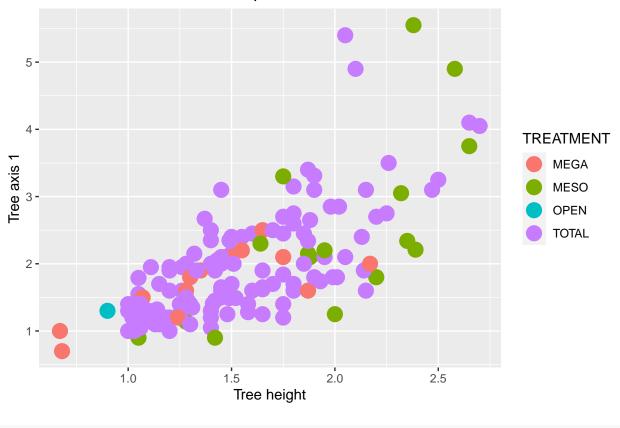
With ggplot, we create layers

```
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", title = "Acacia trees size relationships")
```

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

Acacia trees size relationships



colors()

##	[1]	"white"	"aliceblue"	"antiquewhite"
##	[4]	"antiquewhite1"	"antiquewhite2"	"antiquewhite3"
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##	[25]	"blanchedalmond"	"blue"	"blue1"
##	[28]	"blue2"	"blue3"	"blue4"
##	[31]	"blueviolet"	"brown"	"brown1"
##	[34]	"brown2"	"brown3"	"brown4"
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##	[43]	"cadetblue1"	"cadetblue2"	"cadetblue3"
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                                  "lightcoral"
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                                                           "lightcyan3"
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## [463] "mediumorchid1"
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## [472] "mediumseagreen"
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## [475]
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                                  "mediumvioletred"
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## [481] "mistyrose2"
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