# visualization-uhuru-day2

### Davinder Singh

### 2023-02-28

### getwd()

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

read.csv(file = "../data-raw/ACACIA\_DREPANOLOBIUM\_SURVEY.txt", sep = "\t")

##		SURVEY	YEAR	SITE	${\tt BLOCK}$	TREATMENT	PLOT	ID	HEIGHT	AXIS1	AXIS2	CIRC
##	1	1	2012	SOUTH	1	TOTAL	S1TOTAL	581	2.25	2.75	2.15	20.0
##	2	1	2012	SOUTH	1	TOTAL	S1TOTAL	582	2.65	4.10	3.90	28.0
##	3	1	2012	SOUTH	1	TOTAL	S1TOTAL	3111	1.5	1.70	0.85	17.0
##	4	1	2012	SOUTH	1	TOTAL	S1TOTAL	3112	2.01	1.80	1.60	12.0
##	5	1	2012	SOUTH	1	TOTAL	S1TOTAL	3113	1.75	1.84	1.42	13.0
##	6	1	2012	SOUTH	1	TOTAL	S1TOTAL	3114	1.65	1.62	0.85	15.0
##	7	1	2012	SOUTH	1	TOTAL	S1TOTAL	3115	1.2	1.95	0.90	9.0
##	8	1	2012	SOUTH	1	TOTAL	S1TOTAL	3199	1.45	2.00	1.75	12.2
##	9	1	2012	SOUTH	1	MESO	S1MESO	941	1.87	2.15	1.82	13.0
##	10	1	2012	SOUTH	1	MESO	S1MESO	942	2.38	5.55	4.82	35.0
##	11	1	2012	SOUTH	1	MESO	S1MESO	943	2.58	4.90	4.24	24.0
##	12	1	2012	SOUTH	1	MESO	S1MESO	944	2.65	3.75	3.10	27.0
##	13	1	2012	SOUTH	1	MESO	S1MESO	946	2.35	2.34	2.05	20.0
##	14	1	2012	SOUTH	1	MESO	S1MESO	947	1.88	2.10	1.85	28.0
##	15	1	2012	SOUTH	1	MESO	S1MESO	3116	2.32	3.05	2.63	30.0
##	16	1	2012	SOUTH	1	MESO	S1MESO	3117	2.39	2.21	2.10	13.0
##	17	1	2012	SOUTH	1	MESO	S1MESO	3118	2.2	1.80	1.50	10.0
##	18	1	2012	SOUTH	1	MESO	S1MESO	3119	1.05	0.90	0.55	8.0
##	19	1	2012	SOUTH	1	MESO	S1MESO	3120	2	1.25	1.20	10.0
##	20	1	2012	SOUTH	1	MESO	S1MESO	3131	1.28	1.14	1.00	10.0
##	21	1	2012	SOUTH	2	OPEN	S20PEN	341	dead	NA	NA	NA
##	22	1	2012	SOUTH	2	TOTAL	S2T0TAL	3178	1.4	2.50	2.15	18.0
##	23	1	2012	SOUTH	2	TOTAL	S2T0TAL	101	1.9	3.31	2.65	15.0
##	24	1	2012	SOUTH	2	TOTAL	S2T0TAL	102	1.75	2.70	2.55	16.0
##	25	1	2012	SOUTH	2	TOTAL	S2T0TAL	103	1.8	2.75	2.30	16.0
##	26	1	2012	SOUTH	2	TOTAL	S2T0TAL	104	2.7	4.05	4.00	35.2
##	27	1	2012	SOUTH	2	TOTAL	S2T0TAL	105	2.02	2.85	1.49	17.0
##	28	1	2012	SOUTH	2	TOTAL	S2T0TAL	108	1.9	3.10	2.85	19.0
##	29	1	2012	SOUTH	2	TOTAL	S2T0TAL	109	1.85	2.45	1.90	19.0
##	30	1	2012	SOUTH	2	TOTAL	S2T0TAL	110	1.65	1.90	1.54	17.0
##	31	1	2012	SOUTH	2	TOTAL	S2T0TAL	111	1.4	2.35	1.45	14.0
##	32			SOUTH	2	TOTAL	S2T0TAL	113	2.5	3.25	2.30	
##	33	1	2012	SOUTH	2	TOTAL	S2T0TAL	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
##				SOUTH	2	_	S2TOTAL	118	1.8	3.15	2.55 22.0
##		1	2012	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
##				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
##				SOUTH	2		S2TOTAL		1.25	1.25	0.90 10.0
##				SOUTH	2		S2TOTAL		1.41	1.41	1.40 14.0
##				SOUTH	2		S2TOTAL		1.41	1.60	1.30 13.0
##				SOUTH	2		S2TOTAL		1.0	1.20	1.30 13.0
##				SOUTH	2		S2TOTAL		1.49	1.49	1.20 8.0
##				SOUTH	2		S2TOTAL		1.49	1.50	1.50 14.0
##				SOUTH	2		S2TOTAL				2.00 20.0
##				SOUTH	2		S2TOTAL		1.65	1.65	1.20 10.0
##				SOUTH	2	_	S2TOTAL		1.13 1.25	1.13 1.25	0.90 10.0
							S2TOTAL				
##				SOUTH	2		S2TOTAL S2TOTAL		1.1	1.20	1.10 10.0
##				SOUTH	2				2.2	2.70	2.40 25.0
##				SOUTH	2		S2TOTAL		1.45	1.65	1.25 10.0
##				SOUTH	2		S2TOTAL		1.6	2.45	2.10 13.0
##				SOUTH	2		S2TOTAL		1.55	2.40	1.80 13.0
##				SOUTH	2		S2TOTAL		1.5	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		1.2	1.90	1.65 12.0
##				SOUTH	2		S2TOTAL		1.05	1.10	1.00 9.0
##				SOUTH	2		S2TOTAL		1.8	2.60	2.40 15.0
	68			SOUTH	2		S2TOTAL		1.2	1.00	0.95 7.0
##				SOUTH	2	_	S2TOTAL		1.75	1.40	1.10 10.0
	70			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		1.7	1.70	1.40 12.0
##				SOUTH	2		S2TOTAL			2.85	
##				SOUTH	2		S2TOTAL			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		S2T0TAL			1.80	1.35 13.0
##	88	1	2012	SOUTH	2	TOTAL	S2TOTAL	3156	1.42	1.90	1.80 14.0

##	89	1	2012	SOUTH	2	TOTAL.	S2T0TAL	3157	1.5	2.11	1.75 12.0
##				SOUTH	2		S2TOTAL		1.06	1.05	0.85 4.0
	91			SOUTH	2	_	S2TOTAL		1.49	1.50	1.15 13.0
	92			SOUTH	2		S2TOTAL		1.8	1.60	1.50 14.0
	93			SOUTH	2		S2TOTAL		1.93	1.74	1.20 14.0
##				SOUTH	2		S2TOTAL		1.2	1.60	1.30 10.0
	95			SOUTH	2		S2TOTAL		1.65	1.25	1.10 11.0
	96			SOUTH	2		S2TOTAL		1.52	1.49	1.10 12.0
	97			SOUTH	2		S2TOTAL		1.43	2.05	1.54 13.0
##	98			SOUTH	2		S2TOTAL		1.25	1.40	1.25 13.0
	99			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
##	103			SOUTH	2		S2TOTAL		1.18	1.20	1.00 7.0
	104			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
	107			SOUTH	2		S2MEGA	182		2.13	1.20 20.0
	100			SOUTH	2	MEGA MEGA	S2MEGA S2MEGA	183	1.55	1.80	0.90 8.0
	110			SOUTH	2	MEGA	S2MEGA S2MEGA	184	1.3 1.24	1.20	1.20 25.0
	111										
	111			SOUTH	2	MEGA	S2MEGA	185	1.5	2.10	1.75 16.0 2.20 15.0
				SOUTH	2	MEGA	S2MEGA	186	1.65	2.50	
	113			SOUTH	2	MEGA	S2MEGA	187	2.17	2.00	1.20 15.0
	114			SOUTH	2	MEGA	S2MEGA	188	1.28	1.60	1.50 10.0
	115			SOUTH	2	MEGA	S2MEGA	189	1.07	1.50	1.50 10.0
	116			SOUTH	2	MEGA	S2MEGA	190	0.67	1.00	0.80 8.0
	117			SOUTH	2	MEGA	S2MEGA	191	0.68	0.70	0.60 4.0
	118			SOUTH	2	MEGA	S2MEGA	192	1.87	1.60	1.40 9.0
	119			SOUTH	2	MEGA	S2MEGA	193	1.35	1.90	1.50 14.0
	120			SOUTH	2	MEGA	S2MEGA	194	1.75	2.10	2.10 15.0
	121			SOUTH	2	MESO	S2MESO	462	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			SOUTH	3	OPEN	S30PEN		dead	NA	NA NA
	125			SOUTH	3	OPEN	S30PEN		0.9	1.30	1.10 11.0
	126			SOUTH	3		S3TOTAL		dead	NA	NA NA
	127			SOUTH	3		S3TOTAL		1.8	2.60	2.60 15.0
	128			SOUTH	3		S3TOTAL			3.10	2.20 18.0
	129			SOUTH	3		S3TOTAL		2.15	1.60	1.10 17.0
	130			SOUTH	3		S3TOTAL		1.7	2.50	2.15 15.0
	131			SOUTH	3		S3TOTAL		1.9	1.80	1.50 20.0
	132			SOUTH	3		S3TOTAL		1.95	2.10	1.90 13.0
	133			SOUTH	3		S3TOTAL		1.8	1.70	1.40 13.0
	134			SOUTH	3		S3TOTAL		1.4	2.00	1.60 14.0
	135			SOUTH	3		S3TOTAL		1	1.30	1.20 7.0
	136			SOUTH	3		S3TOTAL		1.75	1.20	1.10 13.0
	137			SOUTH	3		S3TOTAL		1.28	1.50	0.95 4.0
	138			SOUTH	3		S3TOTAL		1	1.40	1.20 4.0
	139			SOUTH	3		S3TOTAL		1.45	1.50	1.30 10.0
	140			SOUTH	3		S3TOTAL		1	1.00	0.75 8.0
	141			SOUTH	3		S3TOTAL			1.00	0.90 6.0
##	142	1	2012	SOUTH	3	TOTAL	S3TOTAL	2155	1.51	2.00	1.80 12.0

```
1 2012 SOUTH
                                     TOTAL S3TOTAL 2156
                                                            1.17 1.10 0.90 10.0
## 143
                               3
## 144
             1 2012 SOUTH
                               3
                                     TOTAL S3TOTAL 2157
                                                            1.33 1.90 1.85 14.0
## 145
             1 2012 SOUTH
                                                             1.3 1.10
                                                                         0.85 8.0
                               3
                                     TOTAL S3TOTAL 2158
## 146
             1 2012 SOUTH
                                     TOTAL S3TOTAL 2159
                                                            1.13 1.10
                                                                         0.90 10.0
                               3
## 147
             1 2012 SOUTH
                               3
                                     TOTAL S3TOTAL 2160
                                                            1.58
                                                                  1.40
                                                                         1.40 13.0
             1 2012 SOUTH
## 148
                               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
                                     TOTAL S3TOTAL 2173
                               3
                                                            1.45 1.60
                                                                         1.10
## 150
                                                                                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
                                                                         1.00
## 153
             1 2012 SOUTH
                               3
                                     TOTAL S3TOTAL 2176
                                                            1.02 1.20
                                                                               8.0
             1 2012 SOUTH
                                     TOTAL S3TOTAL 2177
## 154
                               3
                                                             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
## 157
             1 2012 SOUTH
                               3
                                       MESO S3MESO 1422
                                                                     NA
                                                                           NA
                                                                                 NA
                                                            dead
##
       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
                                TP
                   0
## 10
              0
                   0
                          50
                                TP
## 11
              0
                   0
                           5
                                CS
## 12
              0
                   0
                          60
                                TP
                          60
                                ΤP
## 13
              0
                   0
## 14
              2
                   0
                          60
                                CS
## 15
              2
                   0
                           0
                                CS
## 16
              0
                   0
                           0
                                TP
## 17
              0
                   0
                           0
                                TP
## 18
              0
                   0
                           0
                                CS
## 19
              0
                   0
                           0
                                CM
## 20
              0
                   0
                           0
                                TP
## 21
             NA
                  NA
                          NA
## 22
              0
                   0
                           5
                                CS
## 23
              0
                   0
                          45
                                CS
                          35
## 24
             40
                  50
                                CS
## 25
              8
                   2
                          65
                                CS
## 26
              0
                   0
                          20
                                TP
## 27
                          70
              0
                   0
                                CS
## 28
              0
                   0
                         125
                                CM
## 29
                   0
                         200
              0
                                CM
## 30
              0
                   0
                          10
                                CS
## 31
              0
                   0
                           0
                                CS
## 32
              0
                   0
                          35
                                TP
## 33
              0
                   0
                         300
                                CM
              2
                   2
## 34
                         100
                                CS
## 35
              0
                   0
                          30
                                CM
## 36
              0
                   0
                          50
                                TP
## 37
              0
                   0
                          10
                                CM
## 38
              0
                   0
                          25
                                CS
```

39	0	0	15	TP
40	0	0	0	TP
41	0	0	15	TP
42	0	0	0	TP
43	0	0	40	TP
44	0	0	0	TP
45	0	0	15	CM
46	0	0	0	CM
47	0	0	0	TP
48	0	0	0	TP
49	0	0	1	TP
50	0	0	20	TP
51	0	0	0	TP
52	0	0	0	TP
53	0	0	20	TP
54	0	0	0	TP
55	0	0	0	CN
56	0	0	0	CN
57	0	0	0	TP
58	0	0	5	TP
59	0	0	0	TP
60	0	0	25	TP
61	0	0	25	TP
62	0	0		TP
63	0	0	0	TP
			10	CS
65	1	0		CS
66	0	0	0	TP
67		0	10	TP
68		0	0	TP
69		0	0	TP
70		0	0	TP
71		0	0	TP
72	0	0	0	CS
73		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
	40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91	40       0         41       0         42       0         43       0         44       0         45       0         46       0         47       0         48       0         49       0         50       0         51       0         52       0         53       0         54       0         55       0         56       0         57       0         58       0         59       0         60       0         61       0         62       0         63       0         64       0         65       1         66       0         67       0         70       0         71       0         72       0         73       0         74       0         75       0         76       0         77       0         78       0         84 <td< td=""><td>40       0       0         41       0       0         42       0       0         43       0       0         44       0       0         45       0       0         46       0       0         47       0       0         48       0       0         49       0       0         50       0       0         51       0       0         52       0       0         53       0       0         54       0       0         55       0       0         54       0       0         55       0       0         56       0       0         57       0       0         58       0       0         60       0       0         61       0       0         62       0       0         63       0       0         64       0       0         65       1       0         66       0       0         70       0</td><td>40       0       0       0         41       0       0       15         42       0       0       0         43       0       0       40         44       0       0       0         45       0       0       15         46       0       0       0         47       0       0       0         48       0       0       0         49       0       0       1         50       0       0       20         51       0       0       0         52       0       0       0         52       0       0       0         53       0       0       20         54       0       0       0         55       0       0       0         55       0       0       0         56       0       0       0         57       0       0       0         61       0       0       25         62       0       0       0         62       0       0       0</td></td<>	40       0       0         41       0       0         42       0       0         43       0       0         44       0       0         45       0       0         46       0       0         47       0       0         48       0       0         49       0       0         50       0       0         51       0       0         52       0       0         53       0       0         54       0       0         55       0       0         54       0       0         55       0       0         56       0       0         57       0       0         58       0       0         60       0       0         61       0       0         62       0       0         63       0       0         64       0       0         65       1       0         66       0       0         70       0	40       0       0       0         41       0       0       15         42       0       0       0         43       0       0       40         44       0       0       0         45       0       0       15         46       0       0       0         47       0       0       0         48       0       0       0         49       0       0       1         50       0       0       20         51       0       0       0         52       0       0       0         52       0       0       0         53       0       0       20         54       0       0       0         55       0       0       0         55       0       0       0         56       0       0       0         57       0       0       0         61       0       0       25         62       0       0       0         62       0       0       0

## 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	Е
## 124	NA	NA	NA	
## 125	0	0	0	TP
## 126	NA	NA	NA	
## 127	0	0	50	TP
## 128	0	0	0	TP
## 129	0	0	0	TP
## 130	0	0	2	TP
## 131	0	0	25	TP
## 132	0	0	0	TP
## 133	0	0	0	TP
## 134	0	0	0	TP
## 135	0	0	0	TP
## 136	0	0	0	TP
## 137	0	0	0	TP
## 138	0	0	0	TP
## 139	0	0	0	TP
## 140	0	0	0	TP
## 141	0	0	0	TP
## 142	0	0	0	TP
## 143	0	0	0	TP
## 144	0	0	0	TP
## 145	0	0	0	TP
## 146	0	0	0	TP
110	9	9	•	

```
## 147
              0
                    0
                                 TP
## 148
                                 TР
              0
                    0
                            8
## 149
                    0
                            0
                                 TP
## 150
                    0
                            0
                                 TP
              0
## 151
              0
                    0
                            0
                                 TP
## 152
                    0
                            0
                                 TP
              0
                            0
## 153
              0
                    0
                                 ΤP
## 154
              0
                    0
                            0
                                 TP
## 155
              0
                    0
                           20
                                 TP
                    0
                            2
                                 CS
## 156
              0
## 157
             NA
                   NA
                           NA
```

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

```
acacia$HEIGHT <- as.numeric(acacia$HEIGHT)</pre>
```

## 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
```

```
##
      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
                                                    1.50 1.70 0.85 17.0
## 4
           1 2012 SOUTH
                                 TOTAL S1TOTAL 3112
                                                    2.01 1.80 1.60 12.0
                           1
## 5
           1 2012 SOUTH
                                 TOTAL S1TOTAL 3113
                                                    1.75 1.84 1.42 13.0
                           1
## 6
           1 2012 SOUTH
                           1
                                TOTAL S1TOTAL 3114
                                                    1.65 1.62 0.85 15.0
## 7
           1 2012 SOUTH
                                 TOTAL S1TOTAL 3115
                                                     1.20 1.95 0.90 9.0
                           1
## 8
           1 2012 SOUTH
                           1
                                 TOTAL S1TOTAL 3199
                                                    1.45
                                                          2.00 1.75 12.2
## 9
           1 2012 SOUTH
                                MESO S1MESO 941
                                                    1.87 2.15 1.82 13.0
                           1
## 10
           1 2012 SOUTH
                                MESO S1MESO 942
                                                    2.38 5.55 4.82 35.0
                           1
## 11
           1 2012 SOUTH
                                                     2.58 4.90 4.24 24.0
                           1
                                 MESO S1MESO
                                               943
## 12
           1 2012 SOUTH
                           1
                                  MESO 
                                       S1MESO
                                               944
                                                     2.65 3.75 3.10 27.0
## 13
           1 2012 SOUTH
                           1
                                  MESO S1MESO 946
                                                     2.35 2.34 2.05 20.0
## 14
           1 2012 SOUTH
                           1
                                  MESO S1MESO 947
                                                     1.88 2.10 1.85 28.0
## 15
           1 2012 SOUTH
                                  MESO S1MESO 3116
                                                     2.32 3.05 2.63 30.0
                           1
```

##	16	1	2012	SOUTH	1	MESO	S1MESO	3117	2.39	2.21	2.10 13.0
	17			SOUTH	1	MESO	S1MESO		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
##				SOUTH	1	MESO	S1MESO		1.28	1.14	1.00 10.0
##				SOUTH	2	OPEN	S20PEN	341	NA	NA	NA NA
	22			SOUTH	2		S2TOTAL		1.40	2.50	2.15 18.0
	23			SOUTH	2		S2TOTAL	101	1.90	3.31	2.65 15.0
	24			SOUTH	2		S2TOTAL	102	1.75	2.70	2.55 16.0
##				SOUTH	2		S2TOTAL	103	1.80	2.75	2.30 16.0
##				SOUTH	2		S2TOTAL	104	2.70	4.05	4.00 35.2
	27			SOUTH	2		S2TOTAL	105	2.02	2.85	1.49 17.0
##	28			SOUTH	2		S2TOTAL	108	1.90	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	1.40	2.35	1.45 14.0
	32			SOUTH	2		S2TOTAL	113	2.50	3.25	2.30 22.0
	33			SOUTH	2		S2TOTAL	115	2.05	5.40	4.50 33.0
	34			SOUTH	2		S2TOTAL	116	2.26	3.50	3.10 33.0
	35			SOUTH	2	_	S2TOTAL	117	2.13	2.40	2.30 20.0
	36			SOUTH	2	_	S2TOTAL	118	1.80	3.15	2.55 22.0
	37			SOUTH	2		S2TOTAL		1.85	2.00	2.27 20.0
	38			SOUTH	2		S2TOTAL		1.50	2.15	1.80 15.0
	39			SOUTH	2		S2TOTAL		1.87	2.34	2.05 13.0
	40			SOUTH	2		S2TOTAL		1.58	1.28	0.75 11.0
##				SOUTH	2		S2TOTAL		2.05	2.10	1.75 17.0
	42			SOUTH	2		S2TOTAL		1.75	2.45	3.28 16.0
	43			SOUTH	2		S2TOTAL		1.49	1.50	1.45 13.0
##	44			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
##	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	1	2012	SOUTH	2	TOTAL	S2TOTAL	1238	1.65	1.65	2.00 20.0
##	55	1	2012	SOUTH	2	TOTAL	S2TOTAL	1239	1.13	1.13	1.20 10.0
##	56	1	2012	SOUTH	2	TOTAL	S2TOTAL	1240	1.25	1.25	0.90 10.0
##	57	1	2012	SOUTH	2	TOTAL	S2TOTAL	1251	1.10	1.20	1.10 10.0
##	58	1	2012	SOUTH	2	TOTAL	S2TOTAL	1252	2.20	2.70	2.40 25.0
##	59	1	2012	SOUTH	2	TOTAL	S2T0TAL	1253	1.45	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
##	62	1	2012	SOUTH	2	TOTAL	S2T0TAL	1256	1.50	2.40	2.15 13.0
##	63	1	2012	SOUTH	2	TOTAL	S2T0TAL	1257	1.03	1.20	1.00 10.0
##	64	1	2012	SOUTH	2	TOTAL	S2T0TAL	1258	2.14	1.90	1.70 13.0
##	65	1	2012	SOUTH	2	TOTAL	S2T0TAL	1259	1.20	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	1.80	2.60	2.40 15.0
##	68	1	2012	SOUTH	2	TOTAL	S2T0TAL	2132	1.20	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	S2TOTAL	2134	1.45	3.10	1.80	10.0
##				SOUTH	2		S2TOTAL		1.17	1.20	1.10	5.0
##				SOUTH	2		S2T0TAL		2.15	3.10		22.0
##				SOUTH	2		S2TOTAL		1.70	1.70		12.0
	74			SOUTH	2		S2TOTAL		1.98	2.85		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		10.0
	78			SOUTH	2		S2TOTAL		1.26	1.60		10.0
##				SOUTH	2		S2TOTAL		1.30	1.40	0.80	
##				SOUTH	2		S2TOTAL		1.29	1.44		13.0
##				SOUTH	2		S2TOTAL		1.31	1.35	1.15	7.0
##				SOUTH	2		S2TOTAL		1.15	1.70		10.0
##				SOUTH	2		S2TOTAL		1.13	3.40		15.0
	84			SOUTH	2		S2TOTAL		1.47	2.10	1.61	8.0
##				SOUTH	2		S2TOTAL		1.47	1.79		10.0
##				SOUTH	2		S2TOTAL		2.10	4.90		25.0
##				SOUTH	2		S2TOTAL			1.80		13.0
	88			SOUTH	2		S2TOTAL S2TOTAL		1.99 1.42	1.90		14.0
##				SOUTH	2		S2TOTAL			2.11		12.0
##				SOUTH	2		S2TOTAL		1.50	1.05	0.85	4.0
				SOUTH					1.06			
##				SOUTH	2		S2TOTAL		1.49	1.50		13.0
##				SOUTH	2		S2TOTAL		1.80	1.60		14.0
##				SOUTH	2		S2TOTAL		1.93	1.74		14.0
##					2		S2TOTAL		1.20	1.60		10.0
##				SOUTH	2		S2TOTAL		1.65	1.25		11.0
##				SOUTH	2		S2TOTAL		1.52	1.49		12.0
##				SOUTH	2		S2TOTAL		1.43	2.05		13.0
##				SOUTH	2		S2TOTAL		1.25	1.40		13.0
##				SOUTH	2		S2TOTAL		1.88	2.65		20.0
	100			SOUTH	2		S2TOTAL		1.03	1.40	0.60	
	101			SOUTH	2		S2TOTAL		1.10	1.30		10.0
	102			SOUTH	2		S2TOTAL		1.40	1.05		10.0
	103			SOUTH	2		S2TOTAL		1.05	1.55	0.90	
	104			SOUTH	2		S2TOTAL		1.18	1.20	1.00	7.0
	105			SOUTH	2		S2TOTAL		1.40	1.30		13.0
	106			SOUTH	2		S2TOTAL		1.37	2.67		19.0
	107			SOUTH	2		S2TOTAL		1.32	2.15		11.0
	108			SOUTH	2	MEGA			1.55	2.20		20.0
	109			SOUTH	2	MEGA			1.30	1.80		8.0
	110			SOUTH	2	MEGA	S2MEGA		1.24	1.20		25.0
	111			SOUTH	2	MEGA	S2MEGA		1.50	2.10		16.0
	112			SOUTH	2	MEGA	S2MEGA		1.65	2.50		15.0
	113			SOUTH	2	MEGA	S2MEGA		2.17	2.00		15.0
	114			SOUTH	2	MEGA	S2MEGA		1.28	1.60		10.0
	115			SOUTH	2	MEGA	S2MEGA		1.07	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		14.0
	120			SOUTH	2	MEGA	S2MEGA		1.75	2.10	2.10	
	121			SOUTH	2	MESO	S2MES0	462	1.75	3.30	2.50	
	122			SOUTH	2	MESO	S2MES0	463	1.64	2.30	2.00	
##	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
                              3
                                     TOTAL S3TOTAL 1061
                                                             NA
                                                                   NA
                                                                          NA
                                                                               NA
            1 2012 SOUTH
## 127
                              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
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 1066
                                                                 2.50
                                                                        2.15 15.0
## 130
                                                           1.70
                                                                       1.50 20.0
            1 2012 SOUTH
                                     TOTAL S3TOTAL 1066
## 131
                              3
                                                           1.90
                                                                 1.80
## 132
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 1067
                                                           1.95
                                                                 2.10
                                                                        1.90 13.0
                              3
                                                                       1.40 13.0
## 133
            1 2012 SOUTH
                                     TOTAL S3TOTAL 1068
                                                           1.80
                                                                1.70
## 134
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 1069
                                                           1.40 2.00
                                                                       1.60 14.0
## 135
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 1070
                                                           1.00
                                                                1.30
                                                                       1.20 7.0
## 136
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2139
                                                           1.75
                                                                 1.20
                                                                        1.10 13.0
## 137
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2140
                                                           1.28
                                                                1.50
                                                                        0.95
                                                                             4.0
## 138
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2151
                                                           1.00
                                                                1.40
                                                                        1.20 4.0
## 139
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2152
                                                           1.45
                                                                 1.50
                                                                        1.30 10.0
## 140
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2153
                                                           1.00
                                                                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
                                     TOTAL S3TOTAL 2155
                                                                2.00
                                                                       1.80 12.0
                              3
                                                           1.51
## 143
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2156
                                                           1.17
                                                                 1.10
                                                                        0.90 10.0
            1 2012 SOUTH
                                                           1.33
                                                                1.90
## 144
                              3
                                     TOTAL S3TOTAL 2157
                                                                        1.85 14.0
## 145
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2158
                                                           1.30
                                                                1.10
                                                                        0.85 8.0
            1 2012 SOUTH
## 146
                                     TOTAL S3TOTAL 2159
                                                           1.13 1.10
                                                                        0.90 10.0
                              3
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2160
                                                           1.58
                                                                 1.40
                                                                        1.40 13.0
## 147
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2171
                                                           1.06 1.40
                                                                        1.00 5.0
## 148
## 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
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2174
## 151
                                                           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
## 155
            1 2012 SOUTH
                              3
                                     TOTAL S3TOTAL 2178
                                                           1.45
                                                                 2.10
                                                                        2.05 15.0
## 156
            1 2012 SOUTH
                              3
                                      MESO
                                            S3MESO 1421
                                                           1.95
                                                                2.20
                                                                        1.60 13.0
            1 2012 SOUTH
                                      MESO
                                            S3MESO 1422
## 157
                              3
                                                             NA
                                                                   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
             0
                   0
                         50
                               TP
## 11
             0
                   0
                          5
                               CS
## 12
             0
                   0
                         60
                               TP
## 13
             0
                   0
                         60
                               TP
## 14
             2
                   0
                         60
                               CS
## 15
             2
                   0
                          0
                               CS
## 16
                   0
                          0
                               TP
             0
## 17
             0
                   0
                          0
                               TP
## 18
             0
                   0
                          0
                               CS
## 19
             0
                   0
                          0
                               CM
```

## 20	0	0	0	TP
## 21	NA	NA	NA	
## 22	0	0	5	CS
## 23	0	0	45	CS
## 24	40	50	35	CS
## 25	8	2	65	CS
## 26	0	0	20	TP
## 27	0	0	70	CS
## 28	0	0	125	CM
## 29	0	0	200	CM
## 30	0	0	10	CS
## 31	0	0	0	CS
## 32	0	0	35	TP
## 33	0	0	300	CM
## 34	2	2	100	CS
## 35	0	0	30	CM
## 36	0	0	50	TP
## 37	0	0	10	CM
## 38	0	0	25	CS
## 39	0	0	15	TP
## 40	0	0	0	TP
## 41	0	0	15	TP
## 42	0	0	0	TP
## 43	0	0	40	TP
## 44	0	0	0	TP
## 45	0	0	15	CM
## 46	0	0	0	CM
## 47	0	0	0	TP
## 48	0	0	0	TP
## 49	0	0	1	TP
## 50	0	0	20	TP
## 51	0	0	0	TP
## 52	0	0	0	TP
## 53	0	0	20	TP
## 54 ## 55	0	0	0	TP CN
## 55 ## 56	0 0	0	0 0	CN
	_	_	0	
## 57 ## 58	0	0	5	TP TP
## 59	0	0	0	TP
## 60	0	0	25	TP
## 61	0	0	25	TP
## 62	0	0	20	TP
## 63	0	0	0	TP
## 64	0	0	10	CS
## 65	1	0	25	CS
## 66	0	0	0	TP
## 67	0	0	10	TP
## 68	0	0	0	TP
## 69	0	0	0	TP
## 70	0	0	0	TP
## 71	0	0	0	TP
## 72	0	0	0	CS
## 73	0	0	0	CS

## 74	0	0	25	AB_TP
## 75	0	0	0	TP
## 76	0	0	0	TP
## 77	0	0	0	TP
## 78	0	0	0	CS
## 79	0	0	0	CS
## 80	0	0	0	CS
## 81	0	0	0	CS
## 82	0	0	5	CS
## 83	6	0	0	CS
## 84	0	0	0	CS
## 85	0	0	1	CS
## 86	0	0	25	CS
## 87	0	0	0	CS
## 88	0	0	0	CS
## 89	0	0	10	CS
## 90	0	0	0	CS
## 91	0	0	35	CS
## 92	0	0	0	CS
## 93	0	0	0	CS
## 94	0	0	0	CS
## 95	0	0	0	CS
## 96	0	0	20	CS
## 97	0	0	0	CS
## 98	0	0	0	CM
## 99	0	0	100	CM
## 100	0	0	0	CS
## 101	0	0	0	CS
## 102	0	0	0	CS
## 103	0	0	0	CM
## 104	0	0	0	TP
## 105	0	0	30	CS
## 106	0	0	50	TP
## 107	0	0	10	CS
## 108	0	0	0	CS
## 109	0	0	15	CS
## 110	0	0	10	CS
## 111	5	0	200	CS
## 112	0	0	80	CS
## 113	0	0	150	TP
## 114	0	0	40	TP
## 115	0	0	60	TP
## 116	0	0	0	CS
## 117	0	0	0	TP
## 118	0	0	40	CS
## 119	0	0	20	CS
## 120	0	0	75	TP
## 121	0	0	20	CM
## 122	0	0	0	TP
## 123	0	0	0	E
## 124	NA	NA	NA	
## 125	0	0	0	TP
## 126	NA	NA	NA	
## 127	0	0	50	TP

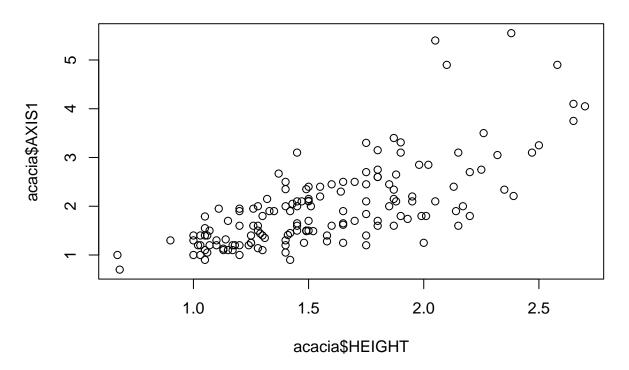
```
## 128
            0
                 0
                              TP
                         0
## 129
                 0
                             TP
            0
                         0
## 130
             0
                 0
                         2
                             TP
## 131
            0
                 0
                        25
                             TP
## 132
                         0
            0
                 0
                              TP
## 133
            0
                 0
                         0
                             TP
## 134
            0
                 0
                         0
                             TP
## 135
                         0
            0
                 0
                             TP
## 136
            0
                 0
                         0
                             TP
## 137
            0
                 0
                         0
                             TP
## 138
            0
                 0
                         0
                             TP
## 139
            0
                 0
                         0
                             TP
## 140
            0
                 0
                         0
                             TP
## 141
            0
                 0
                         0
                             TP
## 142
            0
                 0
                         0
                             TP
## 143
            0
                 0
                         0
                             TP
## 144
            0
                 0
                         0
                             TP
## 145
            0
                 0
                         0
                             TP
## 146
                 0
                         0
                             TP
            0
## 147
            0
                 0
                         0
                             TP
## 148
            0
                 0
                         8
                             TP
## 149
            0
                 0
                         0
                             TP
## 150
            0
                 0
                         0
                             TP
## 151
            0
                 0
                         0
                             TP
## 152
            0
                 0
                         0
                             TP
## 153
            0
                 0
                         0
                             TP
## 154
            0
                 0
                         0
                             TP
## 155
            0
                 0
                        20
                              TP
                         2
                              CS
## 156
            0
                 0
## 157
           NA
                NA
                       NA
```

#### is.numeric(acacia\$HEIGHT)

#### ## [1] TRUE

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

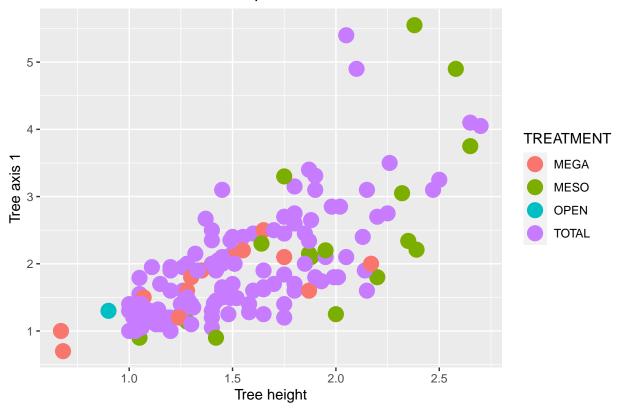
# Acacia height vs axis1



```
library(ggplot2)

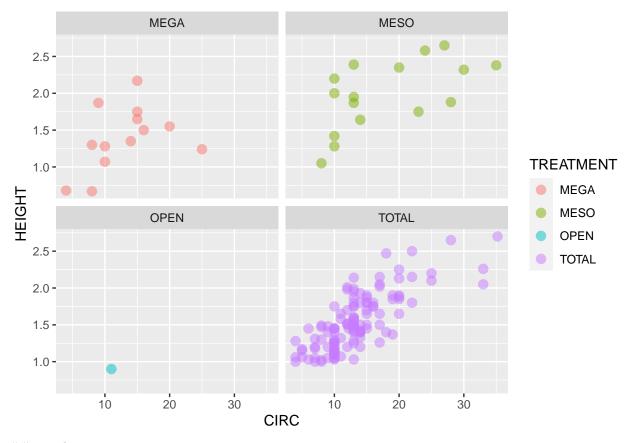
ggplot(data = acacia, mapping = aes(x = HEIGHT, y = AXIS1, color = TREATMENT)) +
   geom_point(size = 5) +
   labs(x = "Tree height", y = "Tree axis 1", title = "Acacia trees size relationships")
```

### Acacia trees size relationships



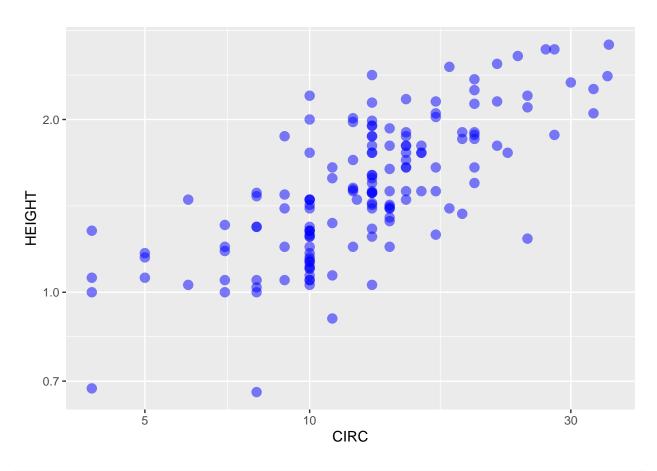
### $facet\_wrap$

```
ggplot(acacia, aes(x = CIRC, y = HEIGHT, color = TREATMENT)) +
  geom_point(size = 3, alpha = 0.5) +
  facet_wrap(~TREATMENT)
```

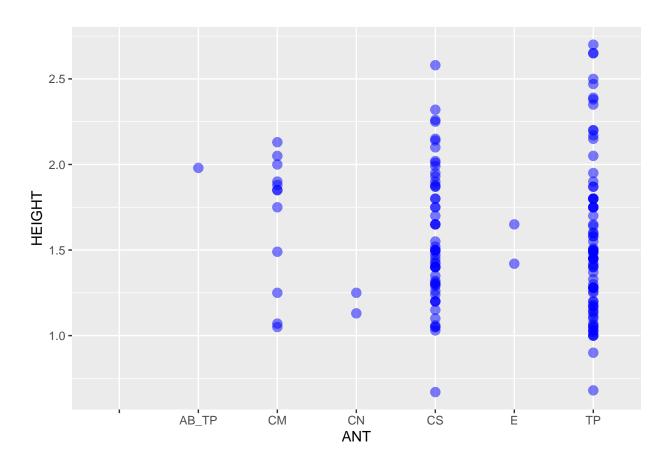


## rescaling axes excerise 1

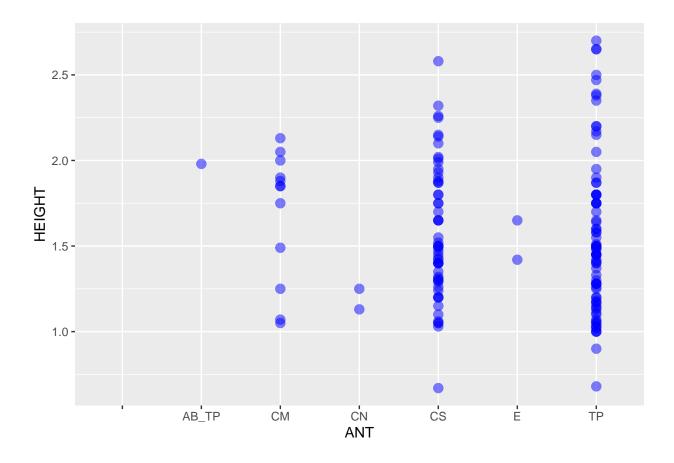
```
ggplot(data = acacia, mapping = aes(x = CIRC, y = HEIGHT)) +
geom_point(size = 3, color = "blue", alpha = 0.5) +
scale_y_log10() +
scale_x_log10() +
labs(xlab = "Circumference",
    ylab = "Canopy Diameter ")
```



```
ggplot(data = acacia, mapping = aes(x = ANT, y = HEIGHT)) +
geom_point(size = 3, color = "blue", alpha = 0.5)
```



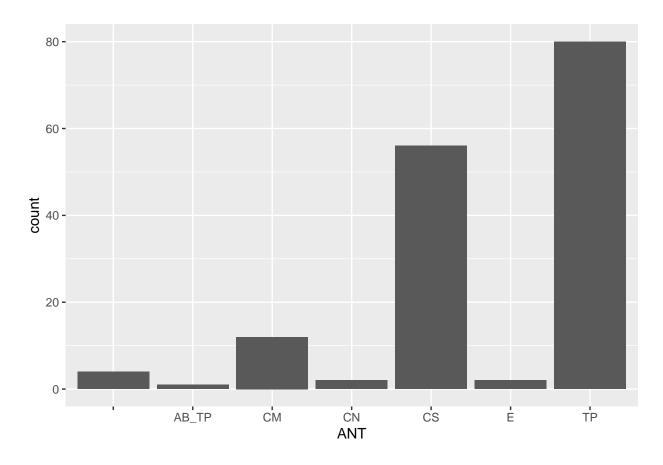
```
ggplot(data = acacia, mapping = aes(x = ANT, y = HEIGHT)) +
geom_point(size = 3, color = "blue", alpha = 0.5)
```



```
geom_smooth()
```

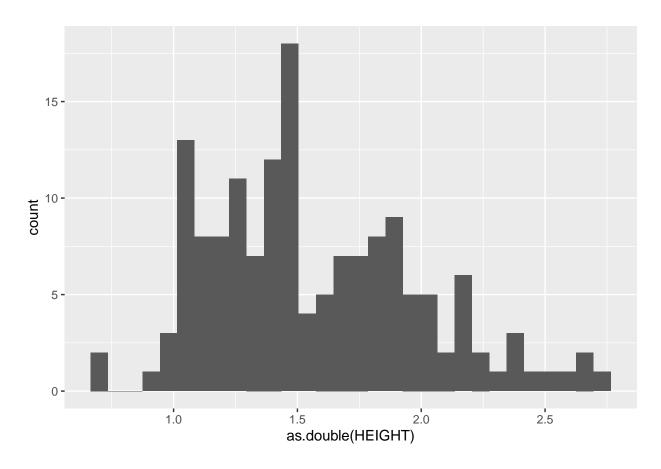
```
## geom_smooth: na.rm = FALSE, orientation = NA, se = TRUE
## stat_smooth: na.rm = FALSE, orientation = NA, se = TRUE
## position_identity
```

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



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

## 'stat\_bin()' using 'bins = 30'. Pick better value with 'binwidth'.



```
ggplot(data = acacia, mapping = aes(x = AXIS1)) +
  geom_histogram(fill = "red", alpha = 0.3) + labs(xlab = "Canopy Diameter", ylab = "Number of Acacia") +
  facet_wrap(~AXIS1)
```

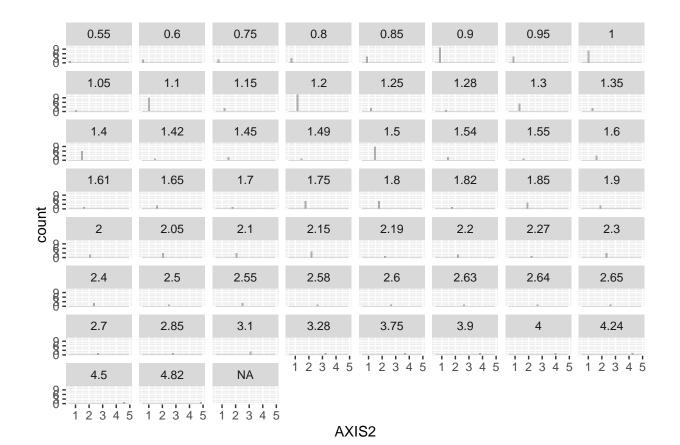
## 'stat\_bin()' using 'bins = 30'. Pick better value with 'binwidth'.



```
ggplot(data = acacia, mapping = aes(x = AXIS2)) +
  geom_histogram(fill = "black", alpha = 0.3) + labs(xlab = "Canopy Diameter", ylab = "Number of Acacia")
  facet_wrap(~AXIS2)
```

<sup>## &#</sup>x27;stat\_bin()' using 'bins = 30'. Pick better value with 'binwidth'.

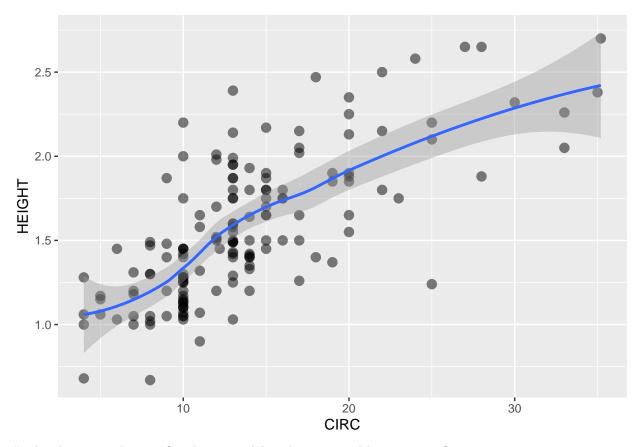
<sup>##</sup> Warning: Removed 4 rows containing non-finite values ('stat bin()').



ggplot(acacia, aes(x = CIRC, y = HEIGHT)) +
geom\_point(size = 3, alpha = 0.5) +
geom\_smooth()

## 'geom\_smooth()' using method = 'loess' and formula = 'y ~ x'

## Warning: Removed 4 rows containing non-finite values ('stat\_smooth()').

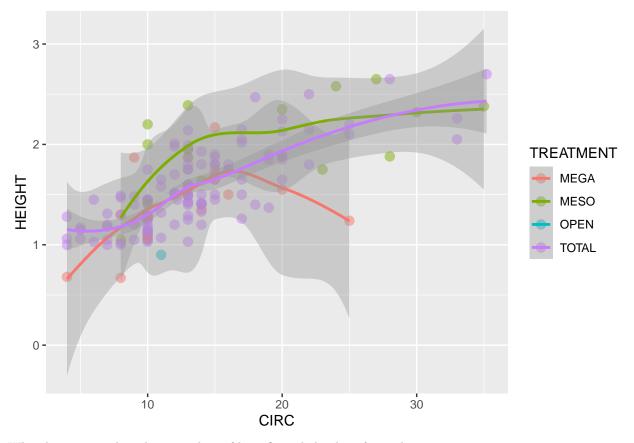


# what happens when we fit a linear model to data grouped by treatment?

```
ggplot(acacia, aes(x = CIRC, y = HEIGHT, color = TREATMENT)) +
geom_point(size = 3, alpha = 0.5) +
geom_smooth()
```

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

## Warning: Removed 4 rows containing non-finite values ('stat\_smooth()').



What happens is that there is a line of best fit and the data for each treatment

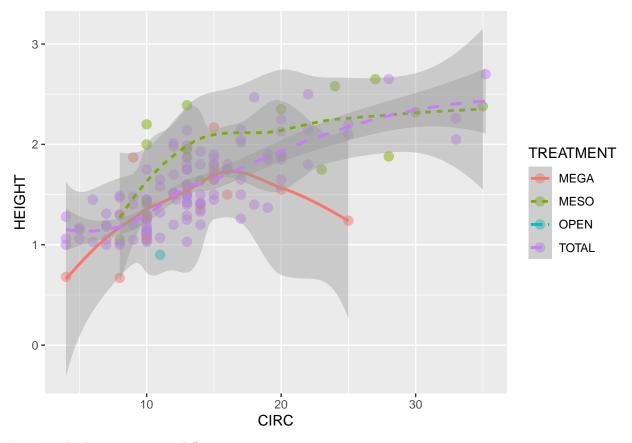
#### line type

```
ggplot(acacia, aes(x = CIRC, y = HEIGHT, color = TREATMENT, linetype = TREATMENT)) +
geom_point(size = 3, alpha = 0.5) +
geom_smooth()

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

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

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

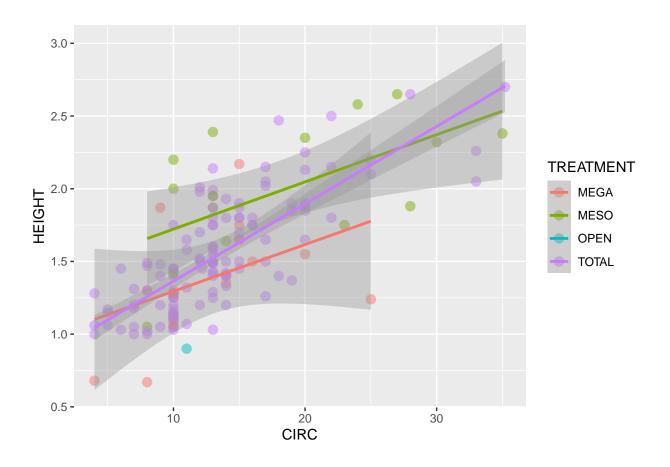


### method = geom\_smooth()

```
ggplot(acacia, aes(x = CIRC, y = HEIGHT, color = TREATMENT)) +
geom_point(size = 3, alpha = 0.5) +
geom_smooth(method = "lm") # try with "glm"
```

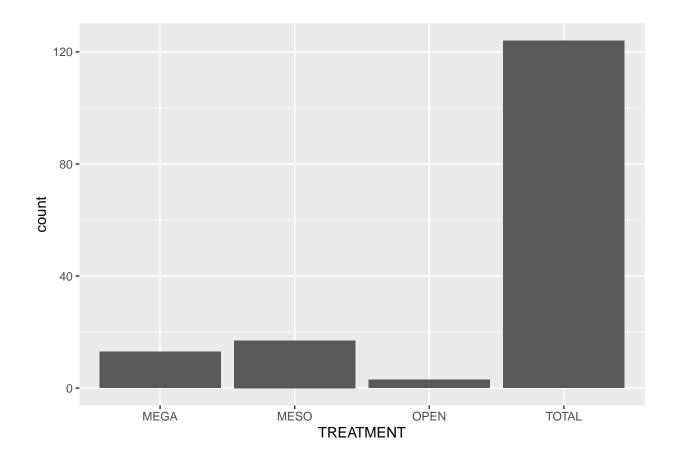
## 'geom\_smooth()' using formula = 'y ~ x'

 $\hbox{\tt \#\# Warning: Removed 4 rows containing non-finite values (`stat\_smooth()`).}$ 



### $geom\_bar$

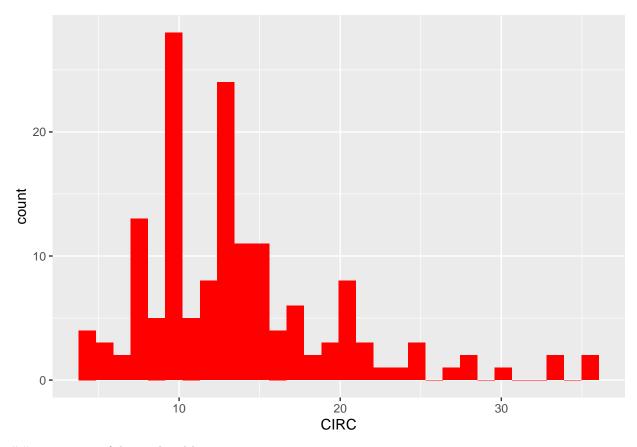
```
ggplot(data = acacia, mapping = aes(x = TREATMENT)) +
geom_bar()
```



# ${\tt geom\_histogram()}$

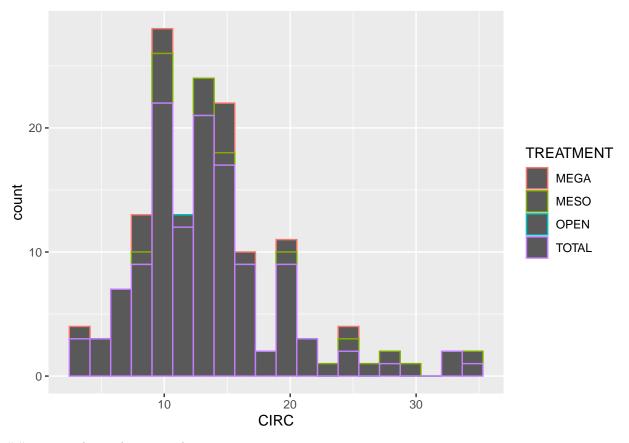
```
ggplot(acacia, aes(x = CIRC)) +
geom_histogram(fill = "red")

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



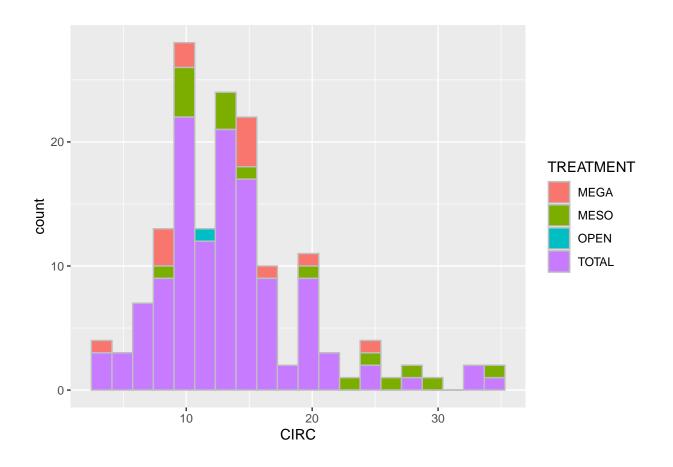
## proportion of data colored by treatment

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

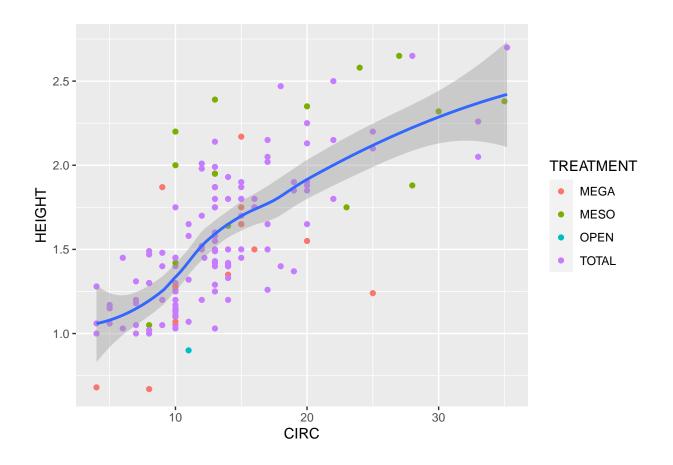


## assign color with gray outline

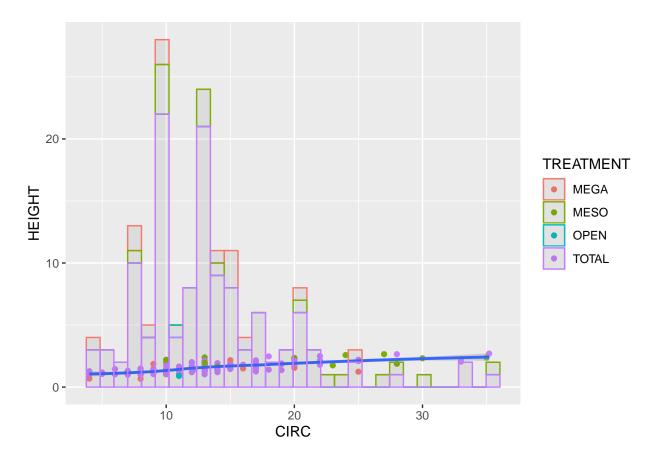
```
ggplot(acacia, aes(x = CIRC, fill = TREATMENT)) +
geom_histogram(bins = 20, color = "gray")
```



### change these values across layers



#### plot categorical and continous data on same plot



#gg save

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

```
## Saving 6.5 x 4.5 in image
## 'geom_smooth()' using method = 'loess' and formula = 'y ~ x'

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

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

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

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

### size of image in inches

```
ggsave("acacia_by_treatment.pdf", height = 5, width = 5)

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

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

```
## 'stat_bin()' using 'bins = 30'. Pick better value with 'binwidth'.
## Warning: Removed 4 rows containing non-finite values ('stat_bin()').
## Warning: Removed 4 rows containing missing values ('geom_point()').
```