Appendix 1 – Identities of experimental individuals

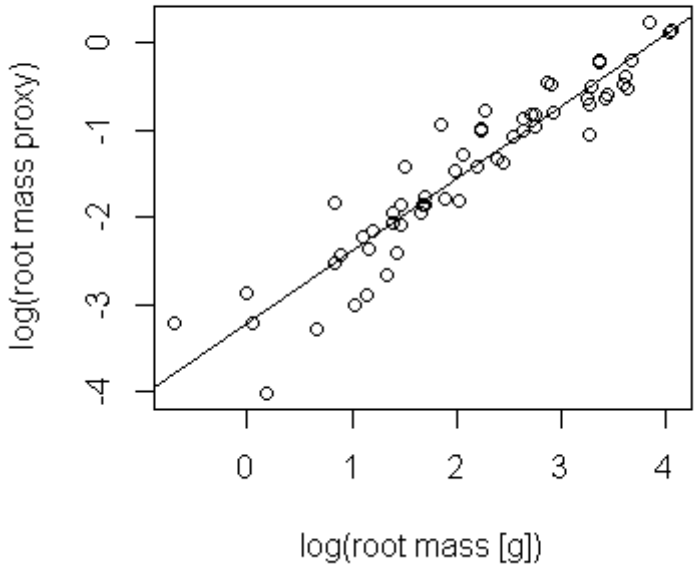
genotype	coordinates	E2	E4	*Agrostis stolonifera*	*Achillea millefolium*	*Alopecurus pratensis*	*Artemisia vulgaris*	*Calamagrostis epigejos*
1	50°0'30.240"N, 14°30'45.065"E	0.5		3				
2	50°0'39.303"N, 14°30'31.979"E	0.9	Salix fragilis	1				
3	50°0'45.933"N, 14°30'25.222"E	0.6		2a				r
4	50°0'41.778"N, 14°30'23.864"E	0.8	Salix fragilis from W	2a	r		r	
5	50°0'30.415"N, 14°30'50.100"E	0.9		4		r		
6	50°0'45.485"N, 14°32'34.151"E	0.7	Salix fragilis from SW	2a				

Carex hirta	*Cerastium sp.*	*Cirsium arvense*	*Dactylis glomerata*	*Elytrigia repens*	*Epilobium sp.*	*Euphorbia helioscopia*	*Festuca arundinacea*	*Galium aparine*	*Geranium pratense*	*Geum urbanum*	*Glechoma hederacea*	*Holcus lanatus*	*Juncus articulatus*
					+								+
	+		2a			+				+	2a		
+			r				1					+	
		r	+				1						
		1	+	1				+	3				

Juncus bufonius	*Leontodon autumnalis*	*Lolium perene*	*Lythrum salicaria*	*Mentha arvensis*	*Persicaria sp.*	*Phalaris arundinacea*	*Phleum pratense*	*Phragmites australis*	*Plantago major*	*Poa annua*	*Poa pratensis*	*Poa trivialis*	*Potentila anserina*
				+	+					+			
		3				1				2b			
						4		+				+	
	r	2b				3			+				
1			1								2a		
							1				1		+

Quercus robur juv.	*Ranunculus repens*	*Roripa sp.*	*Rubus caesius*	*Taraxacum sect. Ruderalia*	*Trifolium hybridum*	*Trifolium repens*
		+		+		+
r						
			1			
						1
	+				+	1
			r			

Appendix 2 – Correlation between root mass and root occupancy from scan



R^2=0.885

Appendix 3 – Root mass contrasts

Whole factors

```
                   Df Sum Sq Mean Sq F value    Pr(>F)
fertil              3 48.617 16.2055 46.6731 2.865e-14 ***
competition         2  2.335  1.1677  3.3631   0.04296 *
fertil:competition  6  4.267  0.7112  2.0483   0.07723 .
Residuals          48 16.666  0.3472
```

Tukey HSD

```
$fertil
                    diff         lwr        upr     p adj
0.0375-0      1.9413911  1.36876234  2.5140198 0.0000000
0.075-0       2.1181422  1.54551342  2.6907709 0.0000000
0.15-0        0.5541363 -0.01849245  1.1267650 0.0611668
0.075-0.0375  0.1767511 -0.39587765  0.7493798 0.8440246
0.15-0.0375  -1.3872548 -1.95988352 -0.8146261 0.0000003
0.15-0.075   -1.5640059 -2.13663460 -0.9913771 0.0000000

$competition
                diff         lwr       upr     p adj
half-comp  0.4753804  0.02472768 0.9260331 0.0365810
full-comp  0.3129660 -0.13768670 0.7636187 0.2234094
full-half -0.1624144 -0.61306710 0.2882383 0.6606230

$`fertil:competition`
                                   diff         lwr         upr     p adj
0.0375:comp-0:comp       1.075565842 -0.20409367  2.35522536 0.1786757
0.075:comp-0:comp        1.617212843  0.33755333  2.89687236 0.0037930
0.15:comp-0:comp         0.272008512 -1.00765100  1.55166803 0.9998354
0:half-0:comp           -0.391578795 -1.67123831  0.88808072 0.9954121
0.0375:half-0:comp       2.235989987  0.95633047  3.51564950 0.0000153
0.075:half-0:comp        2.215829265  0.93616975  3.49548878 0.0000184
```

0.15:half-0:comp	0.806068336	-0.47359118	2.08572785	0.5826959
0:full-0:comp	-0.056736522	-1.33639604	1.22292299	1.0000000
0.0375:full-0:comp	2.064302068	0.78464255	3.34396158	0.0000747
0.075:full-0:comp	2.073069031	0.79340952	3.35272855	0.0000689
0.15:full-0:comp	0.136016670	-1.14364284	1.41567618	0.9999999
0.075:comp-0.0375:comp	0.541647001	-0.73801251	1.82130652	0.9457886
0.15:comp-0.0375:comp	-0.803557329	-2.08321684	0.47610219	0.5872548
0:half-0.0375:comp	-1.467144637	-2.74680415	-0.18748512	0.0126440
0.0375:half-0.0375:comp	1.160424145	-0.11923537	2.44008366	0.1087711
0.075:half-0.0375:comp	1.140263424	-0.13939609	2.41992294	0.1229477
0.15:half-0.0375:comp	-0.269497506	-1.54915702	1.01016201	0.9998495
0:full-0.0375:comp	-1.132302363	-2.41196188	0.14735715	0.1289431
0.0375:full-0.0375:comp	0.988736227	-0.29092329	2.26839574	0.2805530
0.075:full-0.0375:comp	0.997503190	-0.28215632	2.27716270	0.2688127
0.15:full-0.0375:comp	-0.939549171	-2.21920869	0.34011034	0.3521981
0.15:comp-0.075:comp	-1.345204330	-2.62486384	-0.06554482	0.0315143
0:half-0.075:comp	-2.008791638	-3.28845115	-0.72913212	0.0001240
0.0375:half-0.075:comp	0.618777144	-0.66088237	1.89843666	0.8767369
0.075:half-0.075:comp	0.598616423	-0.68104309	1.87827594	0.8982990
0.15:half-0.075:comp	-0.811144507	-2.09080402	0.46851501	0.5734762
0:full-0.075:comp	-1.673949364	-2.95360888	-0.39428985	0.0023611
0.0375:full-0.075:comp	0.447089226	-0.83257029	1.72674874	0.9864999
0.075:full-0.075:comp	0.455856189	-0.82380333	1.73551570	0.9843063
0.15:full-0.075:comp	-1.481196172	-2.76085569	-0.20153666	0.0113349
0:half-0.15:comp	-0.663587308	-1.94324682	0.61607221	0.8201088
0.0375:half-0.15:comp	1.963981474	0.68432196	3.24364099	0.0001860
0.075:half-0.15:comp	1.943820753	0.66416124	3.22348027	0.0002231
0.15:half-0.15:comp	0.534059823	-0.74559969	1.81371934	0.9506699
0:full-0.15:comp	-0.328745034	-1.60840455	0.95091448	0.9990178
0.0375:full-0.15:comp	1.792293556	0.51263404	3.07195307	0.0008550
0.075:full-0.15:comp	1.801060519	0.52140100	3.08072003	0.0007920
0.15:full-0.15:comp	-0.135991842	-1.41565136	1.14366767	0.9999999
0.0375:half-0:half	2.627568782	1.34790927	3.90722830	0.0000004
0.075:half-0:half	2.607408061	1.32774855	3.88706757	0.0000005

```
0.15:half-0:half         1.197647131 -0.08201238  2.47730665 0.0861410
0:full-0:half            0.334842274 -0.94481724  1.61450179 0.9988388
0.0375:full-0:half       2.455880863  1.17622135  3.73554038 0.0000020
0.075:full-0:half        2.464647826  1.18498831  3.74430734 0.0000018
0.15:full-0:half         0.527595466 -0.75206405  1.80725498 0.9545773
0.075:half-0.0375:half  -0.020160721 -1.29982024  1.25949879 1.0000000
0.15:half-0.0375:half   -1.429921651 -2.70958116 -0.15026214 0.0168247
0:full-0.0375:half      -2.292726508 -3.57238602 -1.01306699 0.0000090
0.0375:full-0.0375:half -0.171687918 -1.45134743  1.10797160 0.9999984
0.075:full-0.0375:half  -0.162920955 -1.44258047  1.11673856 0.9999991
0.15:full-0.0375:half   -2.099973316 -3.37963283 -0.82031380 0.0000539
0.15:half-0.075:half    -1.409760930 -2.68942044 -0.13010142 0.0195923
0:full-0.075:half       -2.272565787 -3.55222530 -0.99290627 0.0000109
0.0375:full-0.075:half  -0.151527197 -1.43118671  1.12813232 0.9999996
0.075:full-0.075:half   -0.142760234 -1.42241975  1.13689928 0.9999998
0.15:full-0.075:half    -2.079812595 -3.35947211 -0.80015308 0.0000648
0:full-0.15:half        -0.862804857 -2.14246437  0.41685466 0.4804729
0.0375:full-0.15:half    1.258233732 -0.02142578  2.53789325 0.0578533
0.075:full-0.15:half     1.267000695 -0.01265882  2.54666021 0.0545178
0.15:full-0.15:half     -0.670051665 -1.94971118  0.60960785 0.8110071
0.0375:full-0:full       2.121038590  0.84137908  3.40069810 0.0000444
0.075:full-0:full        2.129805553  0.85014604  3.40946507 0.0000409
0.15:full-0:full         0.192753192 -1.08690632  1.47241271 0.9999948
0.075:full-0.0375:full   0.008766963 -1.27089255  1.28842648 1.0000000
0.15:full-0.0375:full   -1.928285398 -3.20794491 -0.64862588 0.0002565
0.15:full-0.075:full    -1.937052361 -3.21671188 -0.65739285 0.0002371
```

Tukey HSD medium fertilisation

```
                  diff        lwr       upr    p adj
0.075-0.0375 0.1767511 -0.1775457 0.5310479 0.313447


$`competition[filtr]`
                diff        lwr       upr     p adj
half-comp  0.8795203  0.3544795 1.4045610 0.0009329
```

```
full-comp  0.7222962  0.1972554 1.2473370 0.0058991

full-half -0.1572241 -0.6822648 0.3678167 0.7378224


$`fertil[filtr]:competition[filtr]`

                                 diff         lwr       upr     p adj

0.075:comp-0.0375:comp   0.541647001 -0.37767858 1.4609726 0.4714442

0.0375:half-0.0375:comp  1.160424145  0.24109856 2.0797497 0.0078224

0.075:half-0.0375:comp   1.140263424  0.22093784 2.0595890 0.0091944

0.0375:full-0.0375:comp  0.988736227  0.06941064 1.9080618 0.0299247

0.075:full-0.0375:comp   0.997503190  0.07817761 1.9168288 0.0280064

0.0375:half-0.075:comp   0.618777144 -0.30054844 1.5381027 0.3297344

0.075:half-0.075:comp    0.598616423 -0.32070916 1.5179420 0.3642681

0.0375:full-0.075:comp   0.447089226 -0.47223636 1.3664148 0.6652846

0.075:full-0.075:comp    0.455856189 -0.46346940 1.3751818 0.6473729

0.075:half-0.0375:half  -0.020160721 -0.93948631 0.8991649 0.9999998

0.0375:full-0.0375:half -0.171687918 -1.09101350 0.7476377 0.9916246

0.075:full-0.0375:half  -0.162920955 -1.08224654 0.7564046 0.9934164

0.0375:full-0.075:half  -0.151527197 -1.07085278 0.7677984 0.9952966

0.075:full-0.075:half   -0.142760234 -1.06208582 0.7765654 0.9964418

0.075:full-0.0375:full   0.008766963 -0.91055862 0.9280925 1.0000000
```

Appendix 4 – Shoot mass contrasts

Whole factors

```
                   Df Sum Sq Mean Sq F value Pr(>F)
fertil              3 61.356 20.4521 69.8822 <2e-16 ***
competition         2  0.836  0.4182  1.4290 0.2495
fertil:competition  6  2.371  0.3952  1.3505 0.2538
Residuals          48 14.048  0.2927
```

Tukey HSD¨

```
$fertil
                    diff        lwr        upr     p adj
0.0375-0       2.2814909  1.7557637  2.8072181 0.0000000
0.075-0        2.6053629  2.0796357  3.1310902 0.0000000
0.15-0         1.3514680  0.8257408  1.8771952 0.0000001
0.075-0.0375   0.3238720 -0.2018552  0.8495993 0.3667104
0.15-0.0375   -0.9300229 -1.4557501 -0.4042957 0.0001241
0.15-0.075    -1.2538949 -1.7796222 -0.7281677 0.0000004


$competition
                diff        lwr       upr     p adj
half-comp -0.1054120 -0.5191537 0.3083298 0.8120075
full-comp  0.1805334 -0.2332084 0.5942751 0.5461572
full-half  0.2859453 -0.1277964 0.6996871 0.2265425


$`fertil:competition`
                                  diff         lwr         upr     p adj
0.0375:comp-0:comp        1.87413011  0.69928187  3.04897835 0.0000922
0.075:comp-0:comp         2.40216200  1.22731376  3.57701024 0.0000004
0.15:comp-0:comp          1.13862848 -0.03621976  2.31347672 0.0652760
0:half-0:comp            -0.33702386 -1.51187210  0.83782438 0.9973663
0.0375:half-0:comp        1.94675640  0.77190816  3.12160464 0.0000446
0.075:half-0:comp         2.04028814  0.86543990  3.21513638 0.0000174
```

0.15:half-0:comp	1.34325205	0.16840381	2.51810029	0.0130475
0:full-0:comp	-0.20540567	-1.38025391	0.96944257	0.9999762
0.0375:full-0:comp	2.48115667	1.30630843	3.65600491	0.0000002
0.075:full-0:comp	2.83120912	1.65636088	4.00605736	0.0000000
0.15:full-0:comp	1.03009394	-0.14475430	2.20494218	0.1370548
0.075:comp-0.0375:comp	0.52803189	-0.64681635	1.70288013	0.9202491
0.15:comp-0.0375:comp	-0.73550163	-1.91034987	0.43934661	0.5916824
0:half-0.0375:comp	-2.21115397	-3.38600221	-1.03630573	0.0000030
0.0375:half-0.0375:comp	0.07262629	-1.10222195	1.24747453	1.0000000
0.075:half-0.0375:comp	0.16615803	-1.00869021	1.34100627	0.9999973
0.15:half-0.0375:comp	-0.53087806	-1.70572630	0.64397018	0.9175450
0:full-0.0375:comp	-2.07953578	-3.25438402	-0.90468754	0.0000117
0.0375:full-0.0375:comp	0.60702656	-0.56782168	1.78187480	0.8234398
0.075:full-0.0375:comp	0.95707901	-0.21776923	2.13192725	0.2137346
0.15:full-0.0375:comp	-0.84403618	-2.01888442	0.33081206	0.3842768
0.15:comp-0.075:comp	-1.26353352	-2.43838176	-0.08868528	0.0251344
0:half-0.075:comp	-2.73918586	-3.91403410	-1.56433762	0.0000000
0.0375:half-0.075:comp	-0.45540560	-1.63025384	0.71944264	0.9705327
0.075:half-0.075:comp	-0.36187386	-1.53672210	0.81297438	0.9951507
0.15:half-0.075:comp	-1.05890995	-2.23375819	0.11593829	0.1135651
0:full-0.075:comp	-2.60756767	-3.78241591	-1.43271943	0.0000001
0.0375:full-0.075:comp	0.07899466	-1.09585358	1.25384290	1.0000000
0.075:full-0.075:comp	0.42904712	-0.74580112	1.60389536	0.9810302
0.15:full-0.075:comp	-1.37206807	-2.54691631	-0.19721983	0.0102156
0:half-0.15:comp	-1.47565234	-2.65050058	-0.30080410	0.0041166
0.0375:half-0.15:comp	0.80812792	-0.36672032	1.98297616	0.4499749
0.075:half-0.15:comp	0.90165966	-0.27318858	2.07650790	0.2896543
0.15:half-0.15:comp	0.20462357	-0.97022467	1.37947181	0.9999771
0:full-0.15:comp	-1.34403415	-2.51888239	-0.16918591	0.0129618
0.0375:full-0.15:comp	1.34252819	0.16767995	2.51737643	0.0131273
0.075:full-0.15:comp	1.69258064	0.51773240	2.86742888	0.0005452
0.15:full-0.15:comp	-0.10853455	-1.28338279	1.06631369	1.0000000
0.0375:half-0:half	2.28378026	1.10893202	3.45862850	0.0000014
0.075:half-0:half	2.37731200	1.20246376	3.55216024	0.0000006

```
0.15:half-0:half         1.68027591  0.50542767  2.85512415 0.0006135
0:full-0:half            0.13161819 -1.04323005  1.30646643 0.9999998
0.0375:full-0:half       2.81818053  1.64333229  3.99302877 0.0000000
0.075:full-0:half        3.16823298  1.99338474  4.34308122 0.0000000
0.15:full-0:half         1.36711779  0.19226956  2.54196603 0.0106570
0.075:half-0.0375:half   0.09353174 -1.08131650  1.26837998 1.0000000
0.15:half-0.0375:half   -0.60350435 -1.77835259  0.57134389 0.8286854
0:full-0.0375:half      -2.15216207 -3.32701031 -0.97731383 0.0000056
0.0375:full-0.0375:half  0.53440026 -0.64044798  1.70924850 0.9141170
0.075:full-0.0375:half   0.88445272 -0.29039552  2.05930096 0.3163272
0.15:full-0.0375:half   -0.91666247 -2.09151071  0.25818577 0.2675769
0.15:half-0.075:half    -0.69703609 -1.87188433  0.47781215 0.6668450
0:full-0.075:half       -2.24569381 -3.42054205 -1.07084557 0.0000021
0.0375:full-0.075:half   0.44086852 -0.73397972  1.61571676 0.9767517
0.075:full-0.075:half    0.79092098 -0.38392726  1.96576922 0.4828153
0.15:full-0.075:half    -1.01019421 -2.18504245  0.16465403 0.1554244
0:full-0.15:half        -1.54865772 -2.72350596 -0.37380948 0.0021178
0.0375:full-0.15:half    1.13790461 -0.03694363  2.31275285 0.0656187
0.075:full-0.15:half     1.48795707  0.31310883  2.66280531 0.0036850
0.15:full-0.15:half     -0.31315812 -1.48800636  0.86169012 0.9986273
0.0375:full-0:full       2.68656233  1.51171409  3.86141057 0.0000000
0.075:full-0:full        3.03661479  1.86176655  4.21146303 0.0000000
0.15:full-0:full         1.23549960  0.06065136  2.41034784 0.0313970
```

Tukey HSD medium fertilisation

```
$`fertil[filtr]`
                 diff        lwr       upr     p adj
0.075-0.0375 0.323872 0.04640691 0.6013371 0.0240265


$`competition[filtr]`
                diff        lwr       upr     p adj
half-comp -0.1446238 -0.5558059 0.2665583 0.6588209
full-comp  0.5180368  0.1068548 0.9292189 0.0117310
full-half  0.6626606  0.2514785 1.0738427 0.0013872
```

$`fertil[filtr]:competition[filtr]`

	diff	lwr	upr	p adj
0.075:comp-0.0375:comp	0.52803189	-0.19193165	1.2479954	0.2455575
0.0375:half-0.0375:comp	0.07262629	-0.64733725	0.7925898	0.9995508
0.075:half-0.0375:comp	0.16615803	-0.55380551	0.8861216	0.9784091
0.0375:full-0.0375:comp	0.60702656	-0.11293699	1.3269901	0.1341109
0.075:full-0.0375:comp	0.95707901	0.23711547	1.6770426	0.0047483
0.0375:half-0.075:comp	-0.45540560	-1.17536914	0.2645579	0.3950712
0.075:half-0.075:comp	-0.36187386	-1.08183740	0.3580897	0.6345795
0.0375:full-0.075:comp	0.07899466	-0.64096888	0.7989582	0.9993241
0.075:full-0.075:comp	0.42904712	-0.29091642	1.1490107	0.4591891
0.075:half-0.0375:half	0.09353174	-0.62643180	0.8134953	0.9984745
0.0375:full-0.0375:half	0.53440026	-0.18556328	1.2543638	0.2346059
0.075:full-0.0375:half	0.88445272	0.16448918	1.6044163	0.0100302
0.0375:full-0.075:half	0.44086852	-0.27909502	1.1608321	0.4299075
0.075:full-0.075:half	0.79092098	0.07095744	1.5108845	0.0254832
0.075:full-0.0375:full	0.35005246	-0.36991108	1.0700160	0.6654986

Appendix 5 – Fractal dimension contrasts

Whole factors

```
                   Df  Sum Sq  Mean Sq F value    Pr(>F)
fertil              3 0.33682 0.112275 47.6319 1.995e-14 ***
competition         2 0.02409 0.012047  5.1107  0.009723 **
fertil:competition  6 0.03995 0.006658  2.8247  0.019524 *
Residuals          48 0.11314 0.002357
```

Tukey HSD¨

```
$fertil
                     diff          lwr         upr     p adj
0.0375-0      0.15927438  0.112093423  0.20645533 0.0000000
0.075-0       0.19898663  0.151805671  0.24616758 0.0000000
0.15-0        0.13855336  0.091372409  0.18573432 0.0000000
0.075-0.0375  0.03971225 -0.007468707  0.08689320 0.1270954
0.15-0.0375  -0.02072101 -0.067901969  0.02645994 0.6491591
0.15-0.075   -0.06043326 -0.107614217 -0.01325231 0.0070439

$competition
                 diff         lwr         upr     p adj
half-comp  0.04789620  0.01076529 0.085027106 0.0084466
full-comp  0.01465043 -0.02248048 0.051781344 0.6090250
full-half -0.03324576 -0.07037667 0.003885148 0.0876202

$`fertil:competition`
                                  diff          lwr          upr     p adj
0.0375:comp-0:comp       0.099145645 -0.006290139  0.204581429 0.0830695
0.075:comp-0:comp        0.160472328  0.055036544  0.265908112 0.0002156
0.15:comp-0:comp         0.127537726  0.022101942  0.232973510 0.0066785
0:half-0:comp           -0.031051567 -0.136487350  0.074384217 0.9966916
0.0375:half-0:comp       0.222765478  0.117329694  0.328201262 0.0000002
0.075:half-0:comp        0.238693028  0.133257245  0.344128812 0.0000000
```

0.15:half-0:comp	0.148333545	0.042897762	0.253769329	0.0007973
0:full-0:comp	0.011354195	-0.094081589	0.116789979	0.9999998
0.0375:full-0:comp	0.136214640	0.030778856	0.241650423	0.0028106
0.075:full-0:comp	0.178097151	0.072661367	0.283532934	0.0000305
0.15:full-0:comp	0.120091451	0.014655668	0.225527235	0.0136192
0.075:comp-0.0375:comp	0.061326683	-0.044109101	0.166762467	0.6928507
0.15:comp-0.0375:comp	0.028392081	-0.077043703	0.133827865	0.9984956
0:half-0.0375:comp	-0.130197212	-0.235632995	-0.024761428	0.0051415
0.0375:half-0.0375:comp	0.123619833	0.018184049	0.229055617	0.0097536
0.075:half-0.0375:comp	0.139547383	0.034111600	0.244983167	0.0019983
0.15:half-0.0375:comp	0.049187900	-0.056247883	0.154623684	0.8999325
0:full-0.0375:comp	-0.087791450	-0.193227234	0.017644334	0.1888364
0.0375:full-0.0375:comp	0.037068995	-0.068366789	0.142504778	0.9858242
0.075:full-0.0375:comp	0.078951506	-0.026484278	0.184387289	0.3238780
0.15:full-0.0375:comp	0.020945806	-0.084489977	0.126381590	0.9999150
0.15:comp-0.075:comp	-0.032934602	-0.138370386	0.072501182	0.9945450
0:half-0.075:comp	-0.191523895	-0.296959678	-0.086088111	0.0000067
0.0375:half-0.075:comp	0.062293150	-0.043142634	0.167728934	0.6724314
0.075:half-0.075:comp	0.078220700	-0.027215083	0.183656484	0.3371650
0.15:half-0.075:comp	-0.012138783	-0.117574566	0.093297001	0.9999997
0:full-0.075:comp	-0.149118133	-0.254553917	-0.043682349	0.0007335
0.0375:full-0.075:comp	-0.024257688	-0.129693472	0.081178095	0.9996484
0.075:full-0.075:comp	0.017624823	-0.087810961	0.123060606	0.9999849
0.15:full-0.075:comp	-0.040380877	-0.145816660	0.065054907	0.9729944
0:half-0.15:comp	-0.158589293	-0.264025076	-0.053153509	0.0002647
0.0375:half-0.15:comp	0.095227752	-0.010208032	0.200663536	0.1119214
0.075:half-0.15:comp	0.111155302	0.005719519	0.216591086	0.0306456
0.15:half-0.15:comp	0.020795819	-0.084639964	0.126231603	0.9999208
0:full-0.15:comp	-0.116183531	-0.221619315	-0.010747747	0.0195420
0.0375:full-0.15:comp	0.008676914	-0.096758870	0.114112697	1.0000000
0.075:full-0.15:comp	0.050559425	-0.054876359	0.155995208	0.8824762
0.15:full-0.15:comp	-0.007446275	-0.112882058	0.097989509	1.0000000
0.0375:half-0:half	0.253817045	0.148381261	0.359252828	0.0000000
0.075:half-0:half	0.269744595	0.164308811	0.375180379	0.0000000

```
0.15:half-0:half          0.179385112  0.073949328  0.284820896 0.0000264
0:full-0:half             0.042405762 -0.063030022  0.147841545 0.9617186
0.0375:full-0:half        0.167266207  0.061830423  0.272701990 0.0001021
0.075:full-0:half         0.209148718  0.103712934  0.314584501 0.0000009
0.15:full-0:half          0.151143018  0.045707234  0.256578802 0.0005911
0.075:half-0.0375:half    0.015927550 -0.089508233  0.121363334 0.9999947
0.15:half-0.0375:half    -0.074431933 -0.179867716  0.031003851 0.4105641
0:full-0.0375:half       -0.211411283 -0.316847067 -0.105975499 0.0000007
0.0375:full-0.0375:half  -0.086550838 -0.191986622  0.018884945 0.2048460
0.075:full-0.0375:half   -0.044668327 -0.150104111  0.060767456 0.9454647
0.15:full-0.0375:half    -0.102674027 -0.208109810  0.002761757 0.0627467
0.15:half-0.075:half     -0.090359483 -0.195795267  0.015076301 0.1586854
0:full-0.075:half        -0.227338833 -0.332774617 -0.121903050 0.0000001
0.0375:full-0.075:half   -0.102478388 -0.207914172  0.002957395 0.0637487
0.075:full-0.075:half    -0.060595877 -0.166031661  0.044839906 0.7080472
0.15:full-0.075:half     -0.118601577 -0.224037361 -0.013165793 0.0156467
0:full-0.15:half         -0.136979350 -0.242415134 -0.031543567 0.0026000
0.0375:full-0.15:half    -0.012118905 -0.117554689  0.093316878 0.9999997
0.075:full-0.15:half      0.029763606 -0.075672178  0.135199389 0.9977123
0.15:full-0.15:half      -0.028242094 -0.133677878  0.077193690 0.9985655
0.0375:full-0:full        0.124860445  0.019424661  0.230296228 0.0086589
0.075:full-0:full         0.166742956  0.061307172  0.272178739 0.0001082
0.15:full-0:full          0.108737256  0.003301473  0.214173040 0.0378068
0.075:full-0.0375:full    0.041882511 -0.063553273  0.147318295 0.9649127
0.15:full-0.0375:full    -0.016123189 -0.121558972  0.089312595 0.9999939
0.15:full-0.075:full     -0.058005700 -0.163441483  0.047430084 0.7597932
```

Tukey HSD medium fertilisation

```
$`fertil[filtr]`
                    diff        lwr        upr     p adj
0.075-0.0375 0.03971225 0.01388537 0.06553913 0.0040947


$`competition[filtr]`
                  diff         lwr         upr     p adj
```

```
half-comp  0.10092027  0.06264680  0.13919373 0.0000024

full-comp  0.02734691 -0.01092655  0.06562037 0.1961413

full-half -0.07357336 -0.11184682 -0.03529990 0.0001972


$`fertil[filtr]:competition[filtr]`

                                diff          lwr          upr     p adj

0.075:comp-0.0375:comp   0.06132668 -0.005688633  0.128341999 0.0865970

0.0375:half-0.0375:comp  0.12361983  0.056604517  0.190635149 0.0000941

0.075:half-0.0375:comp   0.13954738  0.072532068  0.206562699 0.0000159

0.0375:full-0.0375:comp  0.03706899 -0.029946321  0.104084310 0.5385146

0.075:full-0.0375:comp   0.07895151  0.011936190  0.145966821 0.0144675

0.0375:half-0.075:comp   0.06229315 -0.004722166  0.129308466 0.0790688

0.075:half-0.075:comp    0.07822070  0.011205385  0.145236016 0.0156502

0.0375:full-0.075:comp  -0.02425769 -0.091273004  0.042757627 0.8686373

0.075:full-0.075:comp    0.01762482 -0.049390493  0.084640138 0.9622463

0.075:half-0.0375:half   0.01592755 -0.051087765  0.082942866 0.9754692

0.0375:full-0.0375:half -0.08655084 -0.153566154 -0.019535523 0.0062975

0.075:full-0.0375:half  -0.04466833 -0.111683643  0.022346988 0.3398213

0.0375:full-0.075:half  -0.10247839 -0.169493704 -0.035463073 0.0010439

0.075:full-0.075:half   -0.06059588 -0.127611193  0.006419438 0.0926973

0.075:full-0.0375:full   0.04188251 -0.025132805  0.108897827 0.4079696
```

Appendix 6 – Time model

All test

```
Error: as.factor(indi)

             Df Sum Sq Mean Sq F value   Pr(>F)

fertit        3 101.42   33.81  49.689 9.34e-15 ***

compt         2   0.66    0.33   0.485    0.619

fertit:compt  6   2.41    0.40   0.592    0.735

Residuals    48  32.66    0.68


Error: Within

                   Df Sum Sq Mean Sq F value  Pr(>F)

time                1  84.50   84.50 961.292 < 2e-16 ***

fertit:time         3   0.58    0.19   2.181 0.09441 .

compt:time          2   0.53    0.26   3.002 0.05384 .

fertit:compt:time   6   1.64    0.27   3.109 0.00755 **

Residuals         108   9.49    0.09
```

All coefficients

```
 (Intercept)

  -2.191783


as.factor(indi) :

          fertit0.0375            fertit0.075             fertit0.15

            1.47770980             1.67632112             0.11032990

             comptfull              compthalf fertit0.0375:comptfull

            0.10895476            -0.01926371            -0.19950174

 fertit0.075:comptfull   fertit0.15:comptfull fertit0.0375:compthalf

            0.01543070             0.07770931             0.41798414

 fertit0.075:compthalf   fertit0.15:compthalf

           -0.04889709             0.30011369


Within :
```

```
                        time           fertit0.0375:time             fertit0.075:time
                0.7623320908                -0.0977985464                 0.0063965910
             fertit0.15:time               comptfull:time               compthalf:time
                0.1181205182                -0.0004433734                -0.1029208286
fertit0.0375:comptfull:time  fertit0.075:comptfull:time   fertit0.15:comptfull:time
                0.5123434937                 0.0141679417                 0.1117626639
fertit0.0375:compthalf:time  fertit0.075:compthalf:time   fertit0.15:compthalf:time
                0.1516107633                 0.3603325890                 0.1047545590
```

Medium fertilisation only tests

```
Error: as.factor(indi[filt])
                         Df Sum Sq Mean Sq F value Pr(>F)
fertit[filt]              1  0.296  0.2956   0.682  0.417
compt[filt]               2  0.496  0.2481   0.572  0.572
fertit[filt]:compt[filt]  2  1.823  0.9113   2.101  0.144
Residuals                24 10.408  0.4337

Error: Within
                                    Df Sum Sq Mean Sq F value   Pr(>F)
time[filt]                           1  43.89   43.89 933.113  < 2e-16 ***
fertit[filt]:time[filt]              1   0.00    0.00   0.019  0.89099
compt[filt]:time[filt]               2   0.70    0.35   7.409  0.00143 **
fertit[filt]:compt[filt]:time[filt]  2   1.32    0.66  14.023 1.24e-05 ***
Residuals                           54   2.54    0.05
---
```

Medium fertilisation only tests

```
(Intercept)
  -1.446925


as.factor(indi[filt]) :
                fertit[filt]0.075                    compt[filt]full
                       0.19861132                        -0.09054698
```

```
                  compt[filt]half fertit[filt]0.075:compt[filt]full
                       0.39872042                         0.21493244
fertit[filt]0.075:compt[filt]half
                      -0.46688123


Within :
                                  time[filt]
                                  0.66453354
                fertit[filt]0.075:time[filt]
                                  0.10419514
                  compt[filt]full:time[filt]
                                  0.51190012
                  compt[filt]half:time[filt]
                                  0.04868993
fertit[filt]0.075:compt[filt]full:time[filt]
                                 -0.49817555
fertit[filt]0.075:compt[filt]half:time[filt]
                                  0.20872183
```

Appendix 7 – BUGS code

```
#variance prior

R=ginv(matrix(c(1000,500,500,1000),2,2))

#mean prior

M=c(0,0)

#mean width

S=ginv(matrix(c(1000,500,500,1000),2,2))

#variance width

D=2

model{

        #priors

        muA[1:2]~dmnorm(M[],S[,])

        pA[1:2,1:2]~dwish(R[,],D)

        #likelihood A

        for (i in 1:N){

                A[i,1:2]~dmnorm(muA[],pA[,])

        }

        #centrality

        centr<-muA[1]-muA[2]

        sA<-inverse(pA)

        cor<-sA[1,2]/(sqrt(sA[1,1])*sqrt(sA[2,2]))

}
```

Appendix 8 – GAM specification

Model with fertilisation interaction

```
fm=gam(occup~mass+fert+s(posit)+s(posit,by=fert),family="poisson")
```

Model with root mass interaction

```
mm=gam(occup~mass+fert+s(posit)+s(posit,by=mass), family="poisson")
```

Model with fertilisation interaction and root mass interaction

```
bm=gam(occup~s(posit)+s(posit,by=fert)+s(posit,by=mass), family="poisson")
```

Appendix 9 – MCMC summaries

spring 0

	mu.vect	sd.vect	2.5%	25%	50%	75%	97.5%	Rhat	n.eff
centr	-0.194	0.281	-0.750	-0.362	-0.195	-0.026	0.365	1.001	6100
cor	0.795	0.164	0.355	0.737	0.841	0.906	0.970	1.001	9900
muA[1]	-1.858	0.487	-2.828	-2.141	-1.859	-1.578	-0.879	1.002	4400
muA[2]	-1.664	0.427	-2.528	-1.917	-1.663	-1.416	-0.787	1.001	8100

spring 0.075

	mu.vect	sd.vect	2.5%	25%	50%	75%	97.5%	Rhat	n.eff
centr	-0.305	0.134	-0.573	-0.384	-0.305	-0.224	-0.037	1.001	6000
cor	0.708	0.210	0.153	0.616	0.761	0.859	0.954	1.002	3900
muA[1]	0.340	0.171	0.000	0.242	0.341	0.437	0.681	1.001	10000
muA[2]	0.644	0.199	0.244	0.529	0.645	0.758	1.034	1.001	10000

spring 0.15

	mu.vect	sd.vect	2.5%	25%	50%	75%	97.5%	Rhat	n.eff
centr	0.020	0.032	-0.046	0.001	0.020	0.039	0.084	1.001	10000
cor	0.977	0.023	0.916	0.972	0.983	0.991	0.997	1.001	10000
muA[1]	-0.391	0.156	-0.707	-0.483	-0.389	-0.298	-0.083	1.001	10000
muA[2]	-0.411	0.141	-0.696	-0.493	-0.410	-0.327	-0.132	1.001	10000

summer 0.0375

	mu.vect	sd.vect	2.5%	25%	50%	75%	97.5%	Rhat	n.eff
centr	-0.351	0.116	-0.579	-0.412	-0.352	-0.291	-0.126	1.001	10000
cor	0.934	0.085	0.715	0.921	0.959	0.979	0.996	1.007	4000
muA[1]	0.171	0.370	-0.559	-0.014	0.174	0.363	0.888	1.001	7800
muA[2]	0.522	0.373	-0.217	0.339	0.527	0.713	1.235	1.001	10000

summer 0.075

	mu.vect	sd.vect	2.5%	25%	50%	75%	97.5%	Rhat	n.eff
centr	-0.456	0.046	-0.544	-0.479	-0.456	-0.432	-0.363	1.001	10000
cor	0.933	0.084	0.719	0.919	0.958	0.979	0.995	1.002	10000

```
muA[1]   0.456   0.140  0.180  0.382  0.454  0.530  0.728 1.001 10000
muA[2]   0.912   0.139  0.640  0.839  0.909  0.986  1.183 1.001 10000
```

winter 0

```
       mu.vect sd.vect   2.5%    25%    50%    75%  97.5%  Rhat n.eff
centr   -0.694   0.335 -1.361 -0.883 -0.694 -0.501 -0.024 1.001 10000
cor      0.858   0.134  0.482  0.821  0.899  0.943  0.984 1.003  3800
muA[1]  -2.206   0.515 -3.218 -2.494 -2.206 -1.915 -1.195 1.001 10000
muA[2]  -1.512   0.225 -1.958 -1.638 -1.512 -1.385 -1.066 1.001 10000
```

winter 0.0375

```
       mu.vect sd.vect   2.5%    25%    50%    75%  97.5%  Rhat n.eff
centr   -0.523   0.172 -0.863 -0.622 -0.527 -0.428 -0.163 1.001  7600
cor     -0.002   0.408 -0.754 -0.310 -0.004  0.307  0.761 1.001 10000
muA[1]  -0.705   0.092 -0.882 -0.756 -0.705 -0.653 -0.518 1.001  8200
muA[2]  -0.181   0.146 -0.471 -0.261 -0.181 -0.099  0.111 1.001  8800
```

winter 0.075

```
       mu.vect sd.vect   2.5%    25%    50%    75%  97.5%  Rhat n.eff
centr   -0.580   0.069 -0.713 -0.616 -0.581 -0.546 -0.445 1.001 10000
cor      0.943   0.072  0.746  0.931  0.965  0.983  0.996 1.002  7500
muA[1]  -0.539   0.217 -0.971 -0.651 -0.539 -0.427 -0.106 1.001 10000
muA[2]   0.041   0.181 -0.322 -0.052  0.043  0.134  0.404 1.001 10000
```

winter 0.15

```
       mu.vect sd.vect   2.5%    25%    50%    75%  97.5%  Rhat n.eff
centr   -0.243   0.106 -0.455 -0.303 -0.244 -0.183 -0.028 1.001 10000
cor      0.977   0.026  0.914  0.971  0.984  0.991  0.998 1.008  9300
muA[1]  -1.706   0.407 -2.529 -1.937 -1.706 -1.475 -0.909 1.001 10000
muA[2]  -1.463   0.328 -2.126 -1.652 -1.462 -1.278 -0.819 1.001 10000
```