

Effects of Date of Planting and Fertilizer on Soybean Yield

```
1 option ls=120 ps=75 nocenter nodate;
2 title 'Effects of Date of Planting and Fertilizer on Soybean Yield';
3
4 * An agronomic experiment was conducted to assess the effects of
5 the date of planting (early or late) and the type of fertilizer
6 (none, Aero, Na or K) on the yield of soybeans. 32 homogeneous
7 experimental plots were available. The 8 treatments were randomly
8 assigned to the plots with 4 plots assigned to each treatment.;
9
10 data turnip;
11 input date $ fert $ y1-y4; drop y1-y4; yield=y1; output;
12 yield=y2; output; yield=y3; output; yield=y4; output;
13 label fert='Type of Fertilizer'
14       yield='Yield of Soybeans'
15       date='Date of Planting';
16 cards;
17 early check 28.6 36.8 32.7 32.6
18 early aero  29.1 29.2 30.6 29.1
19 early na    28.4 27.4 26.0 29.3
20 early k     29.2 28.2 27.7 32.0
21 late check  30.3 32.3 31.6 30.9
22 late aero   32.7 30.8 31.0 33.8
23 late na     30.3 32.7 33.0 33.9
24 late k      32.7 31.7 31.8 29.4
25 proc print;
26 proc glm; classes date fert;
27       model yield=date fert date*fert/ss3;
28       means date fert date*fert/tukey;
29       output out=new p=means r=resid;
30
31
32 proc plot; plot means*fert=date means*date=fert;      *interaction plots;
33
34 proc plot; plot resid*means;                          *check residuals;
35
```

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OBS	DATE	FERT	YIELD
1	early	check	28.6
2	early	check	36.8
3	early	check	32.7
4	early	check	32.6
5	early	aero	29.1
6	early	aero	29.2
7	early	aero	30.6
8	early	aero	29.1
9	early	na	28.4
10	early	na	27.4
11	early	na	26.0
12	early	na	29.3
13	early	k	29.2
14	early	k	28.2
15	early	k	27.7
16	early	k	32.0
17	late	check	30.3
18	late	check	32.3
19	late	check	31.6
20	late	check	30.9
21	late	aero	32.7
22	late	aero	30.8
23	late	aero	31.0
24	late	aero	33.8
25	late	na	30.3
26	late	na	32.7
27	late	na	33.0
28	late	na	33.9
29	late	k	32.7
30	late	k	31.7
31	late	k	31.8
32	late	k	29.4

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General Linear Models Procedure
Class Level Information

Class	Levels	Values
DATE	2	early late
FERT	4	aero check k na

Number of observations in data set = 32

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General Linear Models Procedure

Dependent Variable: YIELD Yield of Soybeans

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	86.79375000	12.39910714	4.04	0.0047
Error	24	73.74500000	3.07270833		
Corrected Total	31	160.53875000			
	R-Square	C.V.	Root MSE		YIELD Mean
	0.540640	5.690125	1.75291424		30.80625000

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DATE	1	32.00000000	32.00000000	10.41	0.0036
FERT	3	16.40125000	5.46708333	1.78	0.1780
DATE*FERT	3	38.39250000	12.79750000	4.16	0.0165

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General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: YIELD

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.05 df= 24 MSE= 3.072708
 Critical Value of Studentized Range= 2.919
 Minimum Significant Difference= 1.2791

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	DATE
A	31.8063	16	late
B	29.8063	16	early

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General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: YIELD

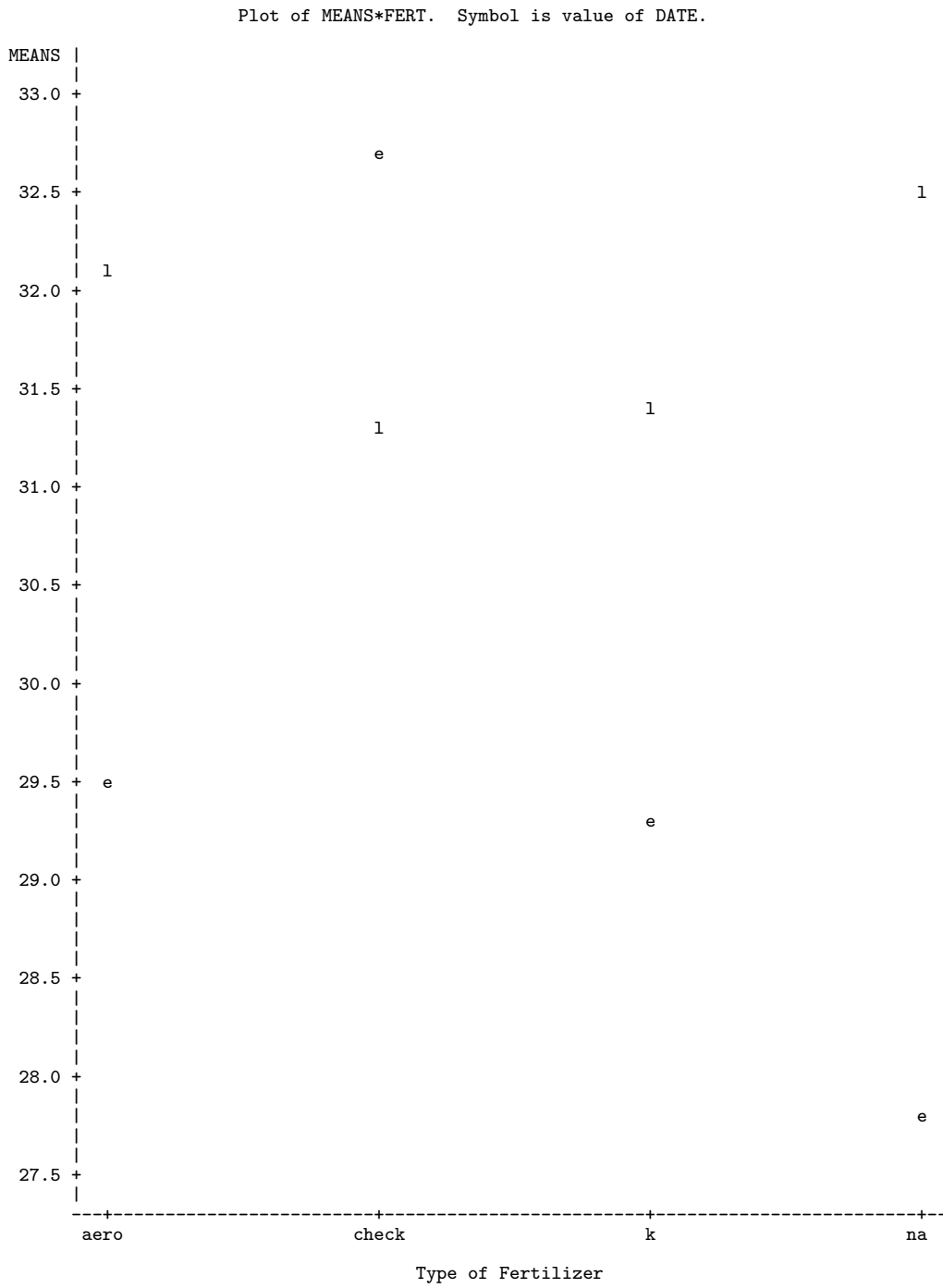
NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.05 df= 24 MSE= 3.072708
 Critical Value of Studentized Range= 3.901
 Minimum Significant Difference= 2.4178

Means with the same letter are not significantly different.

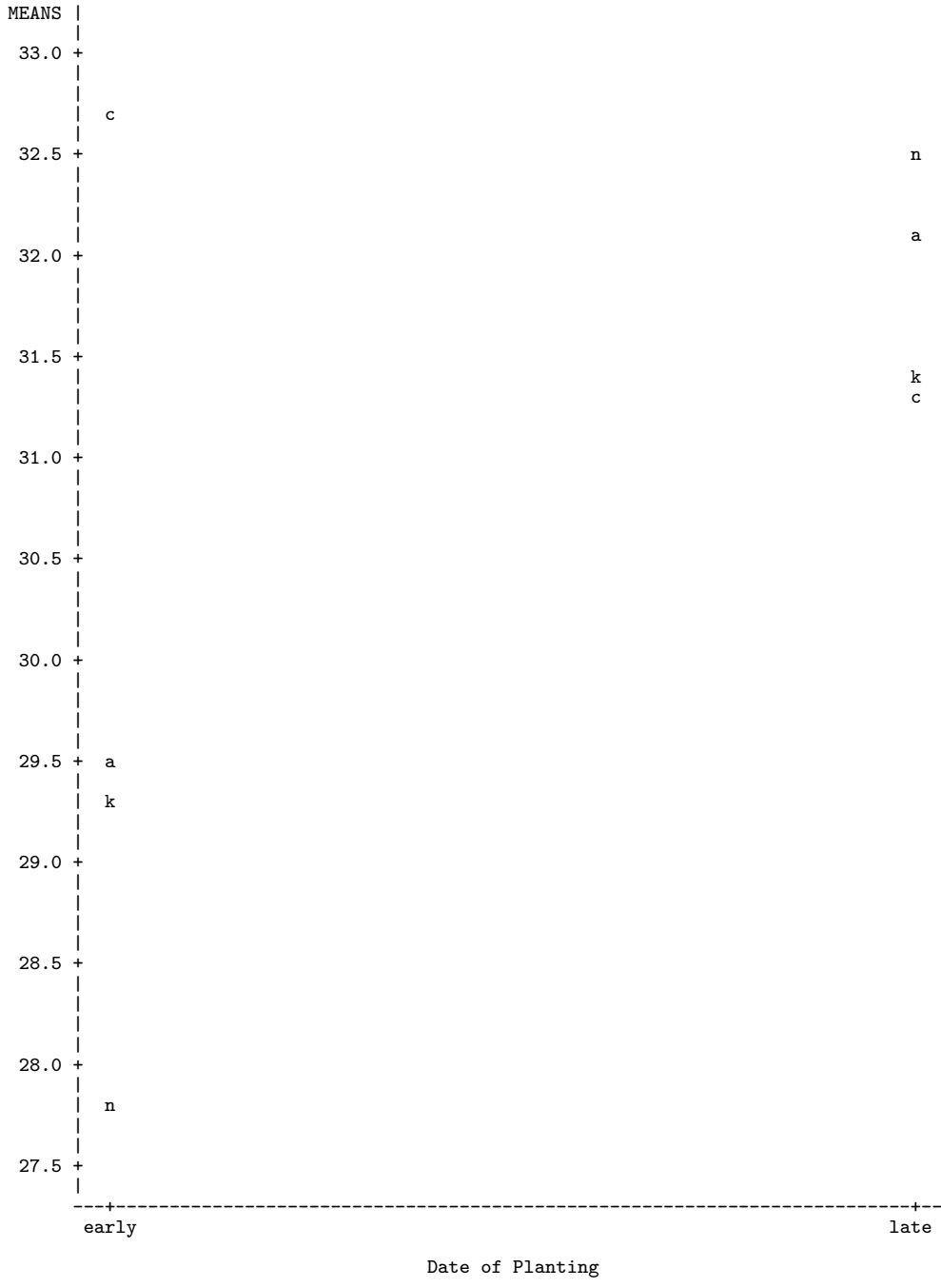
Tukey Grouping	Mean	N	FERT
A	31.9750	8	check
A			
A	30.7875	8	aero
A			
A	30.3375	8	k
A			
A	30.1250	8	na

Level of DATE	Level of FERT	N	-----YIELD-----	
			Mean	SD
early	aero	4	29.5000000	0.73484692
early	check	4	32.6750000	3.34800936
early	k	4	29.2750000	1.92072035
early	na	4	27.7750000	1.41509717
late	aero	4	32.0750000	1.43149106
late	check	4	31.2750000	0.86554414
late	k	4	31.4000000	1.40712473
late	na	4	32.4750000	1.53704261



NOTE: 24 obs hidden.

Plot of MEANS*DATE. Symbol is value of FERT.



NOTE: 24 obs hidden.

Plot of RESID*MEANS. Legend: A = 1 obs, B = 2 obs, etc.

