Analysis of Variance (One-way ANOVA)
Nitrogen content of red clover (S&T 1980)
ANOVA with PROC MIXED - separate variances

The Mixed Procedure

Model Information

Data Set	WORK.CLOVER
Dependent Variable	percent
Covariance Structure	Variance Components
Group Effect	treatment
Estimation Method	REML
Residual Variance Method	None
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Satterthwaite

Class Level Information

Class	Levels	Values
treatment	5	3DOk1 3DOk4 3DOk5 3DOk7 3DOk13

Dimensions

Covariance Parameters	5
Columns in X	6
Columns in Z	0
Subjects	25
Max Obs Per Subject	1

Number of Observations

Number of Observations Read	25
Number of Observations Used	25
Number of Observations Not Used	0

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	117.05518418	
1	1	104.64497787	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Group	Estimate
Residual	treatment 3DOk1	33.6420
Residual	treatment 3DOk4	16.9430
Residual	treatment 3DOk5	14.2670
Residual	treatment 3DOk7	1.2770
Residual	treatment 3DOk13	2.0380

Fit Statistics

-2 Res Log Likelihood	104.6
AIC (smaller is better)	114.6
AICC (smaller is better)	118.9
BIC (smaller is better)	120.7

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
4	12.41	0.0145

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treatment	4	7.08	25.64	0.0003

Contrasts

Label	Num DF	Den DF	F Value	Pr > F
3 low vrs 2 high	1	12.7	21.59	0.0005
odd vrs even	1	5.55	11.66	0.0161
1st vrs 2nd	1	7.21	19.87	0.0027

Least Squares Means

Effect	treatment	Estimate	Standard Error	DF	t Value	Pr > |t|
treatment	3DOk1	28.8200	2.5939	4	11.11	0.0004
treatment	3DOk4	14.6400	1.8408	4	7.95	0.0014
treatment	3DOk5	23.9800	1.6892	4	14.20	0.0001
treatment	3DOk7	19.9200	0.5054	4	39.42	<.0001
treatment	3DOk13	13.2600	0.6384	4	20.77	<.0001

Differences of Least Squares Means

Effect	treatment	_treatment	Estimate	Standard Error	DF	t Value	Pr > |t|	Adjustment	Adj P
treatment	3DOk1	3DOk4	14.1800	3.1807	7.21	4.46	0.0027	Tukey-Kramer	0.0170
treatment	3DOk1	3DOk5	4.8400	3.0954	6.88	1.56	0.1627	Tukey-Kramer	0.5587
treatment	3DOk1	3DOk7	8.9000	2.6427	4.3	3.37	0.0251	Tukey-Kramer	0.0642
treatment	3DOk1	3DOk13	15.5600	2.6713	4.48	5.82	0.0030	Tukey-Kramer	0.0039
treatment	3DOk4	3DOk5	-9.3400	2.4984	7.94	-3.74	0.0058	Tukey-Kramer	0.0404
treatment	3DOk4	3DOk7	-5.2800	1.9089	4.6	-2.77	0.0433	Tukey-Kramer	0.1382
treatment	3DOk4	3DOk13	1.3800	1.9484	4.95	0.71	0.5107	Tukey-Kramer	0.9481
treatment	3DOk5	3DOk7	4.0600	1.7632	4.71	2.30	0.0728	Tukey-Kramer	0.2468
treatment	3DOk5	3DOk13	10.7200	1.8058	5.12	5.94	0.0018	Tukey-Kramer	0.0035
treatment	3DOk7	3DOk13	6.6600	0.8142	7.6	8.18	<.0001	Tukey-Kramer	0.0005

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Post hoc adjustment with macro by Arnold Saxton

Effect=treatment ADJUSTMENT=Tukey-Kramer(P<0.05) bygroup=1

Obs	treatment	Estimate	StdErr	MSGROUP
1	3DOk1	28.8200	2.5939	A
2	3DOk5	23.9800	1.6892	A
3	3DOk7	19.9200	0.5054	AB
4	3DOk4	14.6400	1.8408	BC
5	3DOk13	13.2600	0.6384	C