# Relationship between seeding rate and first production year herbage yield of three varietues of alfalfa at Elora, Ontario, 1991

## The GLIMMIX Procedure

| Model Information | |
|---|---|
| **Data Set** | WORK.SEEDS |
| **Response Variable** | yield |
| **Response Distribution** | Gaussian |
| **Link Function** | Identity |
| **Variance Function** | Default |
| **Variance Matrix** | Not blocked |
| **Estimation Technique** | Restricted Maximum Likelihood |
| **Degrees of Freedom Method** | Containment |

| Class Level Information | | |
|---|---|---|
| **Class** | **Levels** | **Values** |
| **block** | 3 | 1 2 3 |
| **variety** | 3 | Legend OAC Minto Vernal |
| **rate** | 4 | 6 12 18 24 |

| | |
|---|---|
| **Number of Observations Read** | 36 |
| **Number of Observations Used** | 36 |

| Dimensions | |
|---|---|
| **G-side Cov. Parameters** | 1 |
| **R-side Cov. Parameters** | 1 |
| **Columns in X** | 9 |
| **Columns in Z** | 3 |
| **Subjects (Blocks in V)** | 1 |
| **Max Obs per Subject** | 36 |

| Parameter Search | | |
|---|---|---|
| **CovP1** | **CovP2** | **Objective Function** |
| 0.2134 | 0.5427 | 119.90123749 |

| Optimization Information | |
|---|---|
| **Optimization Technique** | Dual Quasi-Newton |
| **Parameters in Optimization** | 2 |
| **Equality Constraints** | 2 |
| **Lower Boundaries** | 2 |

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| Optimization Information | |
|---|---|
| **Upper Boundaries** | 2 |
| **Fixed Effects** | Profiled |
| **Starting From** | Data |

| Iteration History | | | | | |
|---|---|---|---|---|---|
| **Iteration** | **Restarts** | **Evaluations** | **Objective Function** | **Change** | **Max Gradient** |
| **0** | **0** | 4 | 119.90123749 | . | 0 |

Convergence criterion (ABSGCONV=0.00001) satisfied.

| Fit Statistics | |
|---|---|
| **-2 Res Log Likelihood** | 119.90 |
| **AIC (smaller is better)** | 119.90 |
| **AICC (smaller is better)** | 119.90 |
| **BIC (smaller is better)** | 119.90 |
| **CAIC (smaller is better)** | 119.90 |
| **HQIC (smaller is better)** | 119.90 |
| **Generalized Chi-Square** | 15.20 |
| **Gener. Chi-Square / DF** | 0.56 |

| Covariance Parameter Estimates | | |
|---|---|---|
| **Cov Parm** | **Estimate** | **Standard Error** |
| **block** | 0.2134 | . |
| **Residual** | 0.5427 | . |

| Solutions for Fixed Effects | | | | | | |
|---|---|---|---|---|---|---|
| **Effect** | **variety** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > \|t\|** |
| **variety** | Legend | 6.3583 | 1.2137 | 25 | 5.24 | <.0001 |
| **variety** | OAC Minto | 7.0250 | 1.2137 | 25 | 5.79 | <.0001 |
| **variety** | Vernal | 8.3917 | 1.2137 | 25 | 6.91 | <.0001 |
| **x*variety** | Legend | 0.5169 | 0.1800 | 25 | 2.87 | 0.0082 |
| **x*variety** | OAC Minto | 0.4853 | 0.1800 | 25 | 2.70 | 0.0124 |
| **x*variety** | Vernal | 0.02250 | 0.1800 | 25 | 0.12 | 0.9015 |
| **x*x*variety** | Legend | -0.01366 | 0.005907 | 25 | -2.31 | 0.0293 |

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**Solutions for Fixed Effects**

| Effect | variety | Estimate | Standard Error | DF | t Value | Pr > \|t\| |
|---|---|---|---|---|---|---|
| **x*x*variety** | OAC Minto | -0.01505 | 0.005907 | 25 | -2.55 | 0.0174 |
| **x*x*variety** | Vernal | -0.00162 | 0.005907 | 25 | -0.27 | 0.7861 |

**Type I Tests of Fixed Effects**

| Effect | Num DF | Den DF | F Value | Pr > F |
|---|---|---|---|---|
| **variety** | 3 | 25 | 380.88 | <.0001 |
| **x*variety** | 3 | 25 | 4.42 | 0.0126 |
| **x*x*variety** | 3 | 25 | 3.97 | 0.0192 |

**Contrasts**

| Label | Num DF | Den DF | F Value | Pr > F |
|---|---|---|---|---|
| Linear coefficents for Legend vs OAC Minto | 1 | 25 | 0.02 | 0.9020 |
| Linear coefficents for Legend vs Vernal | 1 | 25 | 3.77 | 0.0635 |
| Linear coefficents for OAC Minto vs Vernal | 1 | 25 | 3.30 | 0.0811 |
| Quadratic coefficents for Legend vs OAC Minto | 1 | 25 | 0.03 | 0.8693 |
| Quadratic coefficents for Legend vs Vernal | 1 | 25 | 2.08 | 0.1620 |
| Quadratic coefficents for OAC Minto vs Vernal | 1 | 25 | 2.58 | 0.1206 |
| Regression for Legend vs OAC Minto | 2 | 25 | 1.35 | 0.2771 |
| Regression for Legend vs Vernal | 2 | 25 | 5.46 | 0.0108 |
| Regression for OAC Minto vs Vernal | 2 | 25 | 2.19 | 0.1333 |
| Intercept and regression for Legend vs OAC Minto | 3 | 25 | 1.02 | 0.3984 |
| Intercept and regression for Legend vs Vernal | 3 | 25 | 20.41 | <.0001 |
| Intercept and regression for OAC Minto vs Vernal | 3 | 25 | 15.47 | <.0001 |