

**LIST OF FIGURES****PAGE**

Fig 2.1: Growth curve analysis matrices for the PR data set.....	16
Fig. 4.1: Mean of the AIC, BIC, and AICc values as a function of the number of covariance parameters. The OLS model has been excluded. Kruskal Wallis tests testing if the mean information criteria are significantly higher for models with either UN, CSH or ARH(1) error covariance structures are included.....	94
Fig. 5.1: Means plot of second petiole (leaf 2) length, separated by nutrient level and herbicide application.....	110
Fig. 5.2: Estimates of fixed parameters obtained after the removal of each data point for the no random effects simplistic linear model with $\omega_i = \text{UN}$ ...	120
Fig. 5.3: Plots of scaled residuals for the no random effects simplistic linear model with $\omega_i = \text{UN}$ .....	121
Fig. 5.4: Plots of the influence diagnostics for the no random effects simplistic linear model with $\omega_i = \text{UN}$ .....	123
Fig. 5.5: Estimates of fixed parameters obtained after the removal of each data point for the random intercept and slope simplistic linear model with $\omega_i = \text{CSH}$ and $\Sigma = \text{CSH}$ .....	125

Fig. 5.6: Plots of scaled residuals for the random intercept and slope simplistic linear model with $\omega_i = \text{CSH}$ and $\Sigma = \text{CSH}$ .....	126
Fig. 5.7: Plots of the influence diagnostics for the random intercept and slope simplistic linear model with $\omega_i = \text{CSH}$ and $\Sigma = \text{CSH}$ .....	126
Fig. 5.8: Estimates of fixed parameters obtained after the removal of each data point for the random intercept and slope simplistic linear model with $\omega_i$ $= \text{VC}$ and $\Sigma = \text{UN}$ .....	127
Fig. 5.9: Plots of scaled residuals for the random intercept and slope simplistic linear model with $\omega_i = \text{VC}$ and $\Sigma = \text{UN}$ .....	127
Fig. 5.10: Plots of the influence diagnostics for the random intercept and slope simplistic linear model with $\omega_i = \text{VC}$ and $\Sigma = \text{UN}$ .....	129
Fig. 5.11: Estimates of fixed parameters obtained after the removal of each data point for the random intercept simplistic linear model with $\omega_i = \text{AR}(1)$ ..	130
Fig. 5.12: Plots of scaled residuals for the random intercept simplistic linear model with $\omega_i = \text{AR}(1)$ .....	130
Fig. 5.13: Plots of the influence diagnostics for the random intercept simplistic linear model with $\omega_i = \text{AR}(1)$ .....	131

Fig. 5.14: Estimates of fixed parameters obtained after the removal of each data point for the no random effects simplistic linear model with $\omega_i =$ TOEP.....	133
Fig. 5.15: Plots of scaled residuals for the no random effects simplistic linear model with $\omega_i =$ TOEP.....	133
Fig. 5.16: Plots of the influence diagnostics for the no random effects model simplistic linear with $\omega_i =$ TOEP.....	134
Fig. 5.17: Estimates of fixed parameters obtained after the removal of each data point for the simplistic linear OLS model with independent error covariance structure.....	135
Fig. 5.18: Plots of scaled residuals for the simplistic linear OLS model with independent error covariance structure.....	135
Fig. 5.19: Plots of the influence diagnostics for the simplistic linear OLS model with independent error covariance structure.....	136
Fig. 5.20: Plot of semi-variogram (left) and the covariances (right) as function of lag in weeks between observations for the no random effects simplistic linear model with $\omega_i =$ UN.....	139

Fig. 5.21: Plot of semi-variogram (left) and the covariances (right) as function of lag in weeks between observations for the simplistic linear model with $\omega_i = \text{CSH}$ and $\Sigma = \text{CSH}$ .....	140
Fig. 5.22: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the simplistic linear model with $\omega_i = \text{VC}$ and $\Sigma = \text{UN}$ .....	142
Fig. 5.23: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the random intercept simplistic linear model with $\omega_i = \text{AR}(1)$ .....	143
Fig. 5.24: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the no random effects simplistic linear model with $\omega_i = \text{TOEP}$ .....	144
Fig. 5.25: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the no random effects simplistic linear model with $\omega_i = \text{VC}$ .....	145
Fig. 5.26: Plot of the predicted mean log response over week superimposed over the plot for the observed mean log response. The error bars represent the 95% confidence interval of the predicted mean values.....	160

Fig. 5.27: Plots of scaled residuals for the quadratic model with no random effects and $\omega_i = \text{UN}$ .....	161
Fig. 5.28: Plots of the influence diagnostics for the quadratic model with no random effects and $\omega_i = \text{UN}$ .....	162
Fig. 5.29: Plots of scaled residuals for the quadratic model with random intercept and slope, and $\omega_i = \text{ARH}(1)$ and $\Sigma = \text{UN}$ .....	163
Fig. 5.30: Plots of influence diagnostics for the quadratic model with random intercept and slope, and $\omega_i = \text{ARH}(1)$ and $\Sigma = \text{UN}$ .....	164
Fig. 5.31: Plots of scaled residuals for the quadratic model with random intercept and slope, and $\omega_i = \text{AR}(1)$ and $\Sigma = \text{UN}$ .....	164
Fig. 5.32: Plots of influence diagnostics for the quadratic model with random intercept and slope, and $\omega_i = \text{AR}(1)$ and $\Sigma = \text{UN}$ .....	165
Fig. 5.33: Plots of scaled residuals for the quadratic model with no random effects, and $\omega_i = \text{TOEP}$ .....	166
Fig. 5.34: Plots of influence diagnostics for the quadratic model with no random effects, and $\omega_i = \text{TOEP}$ .....	167

Fig. 5.35: Plots of scaled residuals for the quadratic model with random intercept and slope, and $\omega_i = \text{VC}$ and $\Sigma = \text{UN}$ .....	167
Fig. 5.36: Plots of influence diagnostics for the quadratic model with random intercept and slope, and $\omega_i = \text{VC}$ and $\Sigma = \text{UN}$ .....	168
Fig. 5.37: Plots of scaled residuals for the quadratic model with random intercept, and $\omega_i = \text{AR}(1)$ .....	169
Fig. 5.38: Plots of influence diagnostics for the quadratic model with random intercept, and $\omega_i = \text{AR}(1)$ .....	170
Fig. 5.39: Plots of scaled residuals for the quadratic model with no random effects, and $\omega_i = \text{VC}$ (OLS Model).....	171
Fig. 5.40: Plots of influence diagnostics for the quadratic model with no random effects, and $\omega_i = \text{VC}$ (OLS Model).....	171
Fig. 5.41: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the no random effects quadratic model with $\omega_i = \text{UN}$ .....	173
Fig. 5.42: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the random intercept and slope quadratic model with $\omega_i = \text{ARH}(1)$ and $\Sigma = \text{UN}$ .....	174

Fig. 5.43: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the random intercept and slope quadratic model with  $\omega_i = \text{AR}(1)$  and  $\Sigma = \text{UN}$ ..... 175

Fig. 5.44: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the no random effects quadratic model with  $\omega_i = \text{TOEP}$ ..... 176

Fig. 5.45: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the random intercept and slope quadratic model with  $\omega_i = \text{VC}$  and  $\Sigma = \text{UN}$ ..... 177

Fig. 5.46: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the random intercept quadratic model with  $\omega_i = \text{AR}(1)$ ..... 178

Fig. 5.46: Plot of semi-variogram (left) and the covariances (right) as a function of lag in weeks between observations for the quadratic model with VC errors (OLS model)..... 179

Fig. 6.1: Plot of observed responses for control plants according to each tub. The observations for plant 1 are offset to the left and those for plant 2 are offset to the right..... 186

Fig. 6.2: Plot of observed responses for sprayed plants according to each tub. The observations for plant 1 are offset to the left and those for plant 2 are offset to the right..... 186