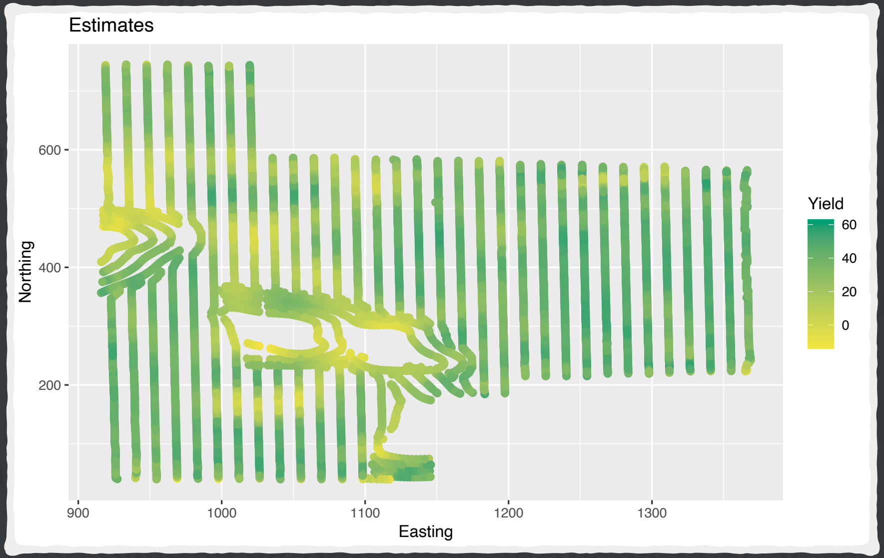
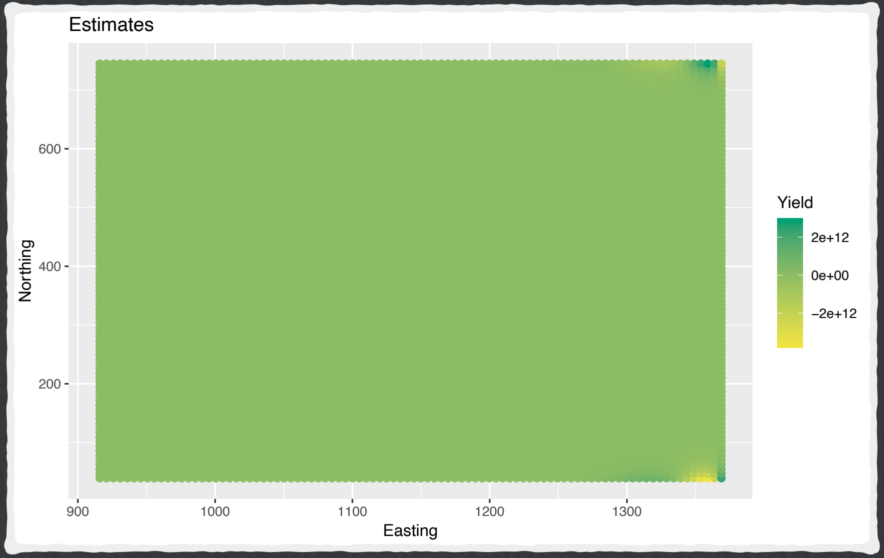
All Strips





- **Likelihood test to compare 2D models with and without treatment effect**
- Likelihood ratio test

```
Model 1: Yield ~ poly(Easting, 21) *
poly(Northing, 21)
Model 2: Yield ~ poly(Easting, 21) *
poly(Northing, 21) + Sprayed
  #Df LogLik Df  Chisq Pr(>Chisq)
1 485 -29622
2 486 -29622  1 1.8792     0.1704
```

- **and**
  $H_{2D} : \tau = 0.833, p(t) = 0.183$
- **This requires interpolation and extrapolation.**

Correlated Errors Likelihood

- **Up to this point, we've assumed a simple likelihood function, with only one random effect**

$$\mathscr{L}_1\left(\beta_1, \sigma^2 \,|\, y_1, \ldots, y_n\right) = \left(\sqrt{2\pi\sigma^2}\right)^{-n} \mathbf{exp}\left\{-\frac{1}{2\sigma^2}\sum\left(y_i - X\beta\right)^2\right\}$$

- **A more appropriate model includes structured random effects**

$$\mathscr{L}\left(\beta, V \,|\, y_1, \ldots, y_n\right) = (2\pi)^{-nK/2}\left|V\right|^{-n/2} \mathbf{exp}\left\{-\frac{1}{2}\sum\left(y_n - X\beta\right)V^{-1}\left(y_n - X\beta\right)\right\}$$

where V **is a matrix describing the spatial correlation model, e.g.**

$$V[s_i, s_j] = \mathbf{Cov}\left(s_i, s_j\right) = c_0 + \sigma^2 \mathbf{exp}\left(- \parallel s_i - s_j \parallel /\alpha\right)$$