$$
\begin{aligned}
&y_i \sim \text{normal}(\mu, \sigma_y) \\
&\mu = \alpha + \alpha_{sp[id]} + \beta * gdd \\
&\alpha_{sp} \sim \text{normal}(0, \sigma_{\alpha sp}) \\
&\alpha_{sp[id]} \sim \text{normal}(\alpha_{sp}, \sigma_{\alpha sp})
\end{aligned}
$$

$$
\begin{aligned}
&y_i \sim \text{normal}(\mu, \sigma_y) \\
&\mu = \alpha + \alpha_{sp[id]} + \alpha_{site} + \beta * gdd \\
&\alpha_{sp} \sim \text{normal}(0, \sigma_{\alpha sp}) \\
&\alpha_{sp[id]} \sim \text{normal}(\alpha_{sp}, \sigma_{\alpha sp}) \ \alpha_{site} \sim \text{normal}(0, \sigma_{\alpha site})
\end{aligned}
$$

$$
\begin{aligned}
&y_i \sim \text{normal}(\mu, \sigma_y) \\
&\mu = \alpha + \alpha_{sp} + \alpha_{site} + \alpha_{treeid} + \beta * gdd \\
&\alpha_{sp} \sim \text{normal}(0, \sigma_{\alpha sp}) \\
&\alpha_{site} \sim \text{normal}(0, \sigma_{\alpha site}) \ \alpha_{treeid} \sim \text{normal}(0, \sigma_{\alpha treeid})
\end{aligned}
$$