Average Height

2024-12-13

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## v forcats   1.0.0     v stringr   1.5.1
## v ggplot2   3.5.1     v tibble    3.2.1
## v lubridate 1.9.3     v tidyr     1.3.1
## v purrr     1.0.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(readr)
library(readxl)
library(vegan)
```

```
## Loading required package: permute
## Loading required package: lattice
## This is vegan 2.6-8
```

```
library(ggordiplots)
```

```
## Loading required package: glue
```

```
library(ggrepel)
library(cowplot)
```

```
##
## Attaching package: 'cowplot'
##
## The following object is masked from 'package:lubridate':
##
##     stamp
```

```
library(lme4)
```

```
## Loading required package: Matrix
##
## Attaching package: 'Matrix'
##
## The following objects are masked from 'package:tidyr':
##
##     expand, pack, unpack
```

```
library(glmmTMB)
library(sjPlot)
```

```
## Learn more about sjPlot with 'browseVignettes("sjPlot")'.
```

```
##
## Attaching package: 'sjPlot'
##
## The following objects are masked from 'package:cowplot':
##
##     plot_grid, save_plot
```

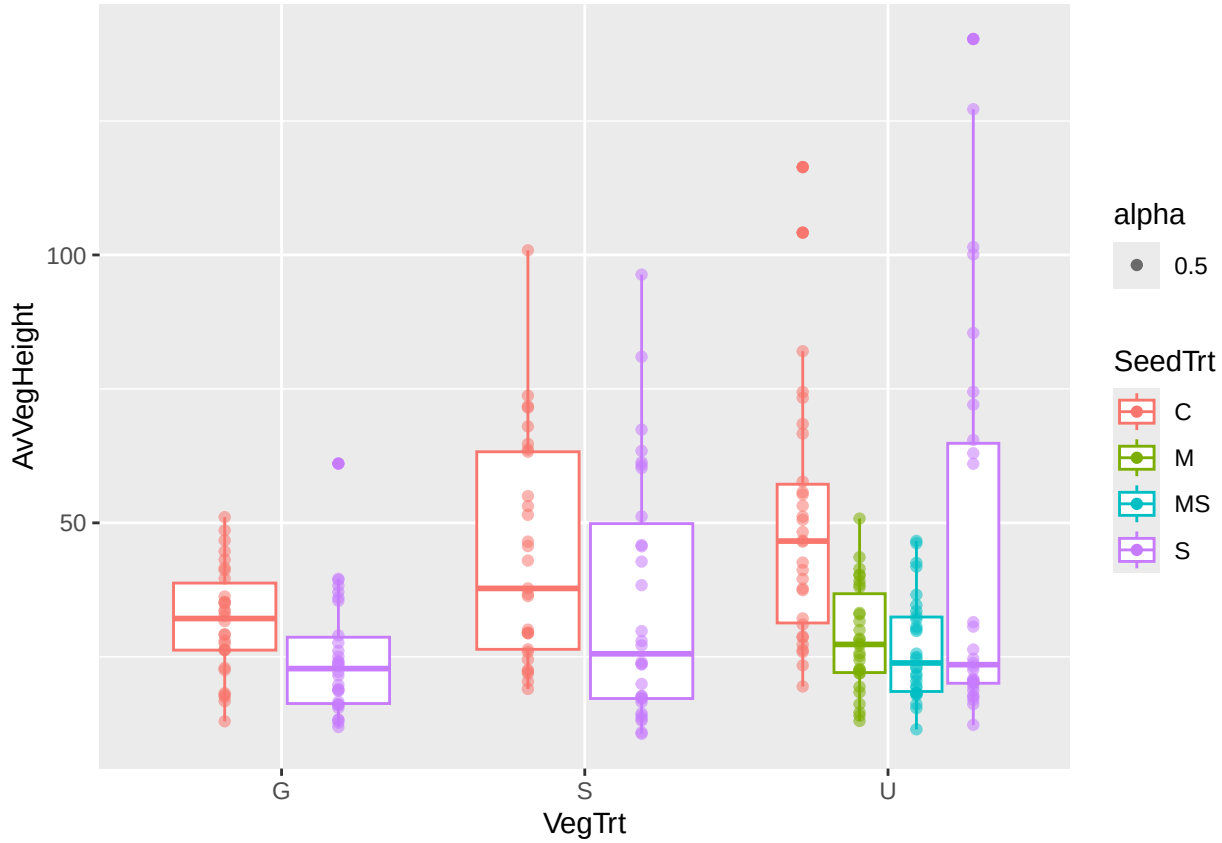
```
library(broom)

#import
SumMust_Height <- read_excel("Data/SumMust_PlusVegHeight.xlsx")
```

```
## New names:
## * `` -> `...7`
```

```
#setup data types
SumMust_Height$Year.s <- as.factor(SumMust_Height$Year-2021)
SumMust_Height$Mustard.r <- as.integer(round(SumMust_Height$Mustard))
SumMust_Height$VegTrt <- as.factor(SumMust_Height$VegTrt)
SumMust_Height$SeedTrt <- as.factor(SumMust_Height$SeedTrt)
SumMust_Height$AvVegHeight <- as.numeric(SumMust_Height$AvVegHeight)

#plot
ggplot(SumMust_Height, aes(VegTrt, AvVegHeight, color = SeedTrt)) +
  geom_boxplot() +
  geom_point(aes(alpha = 0.5), position = position_dodge(0.75))
```



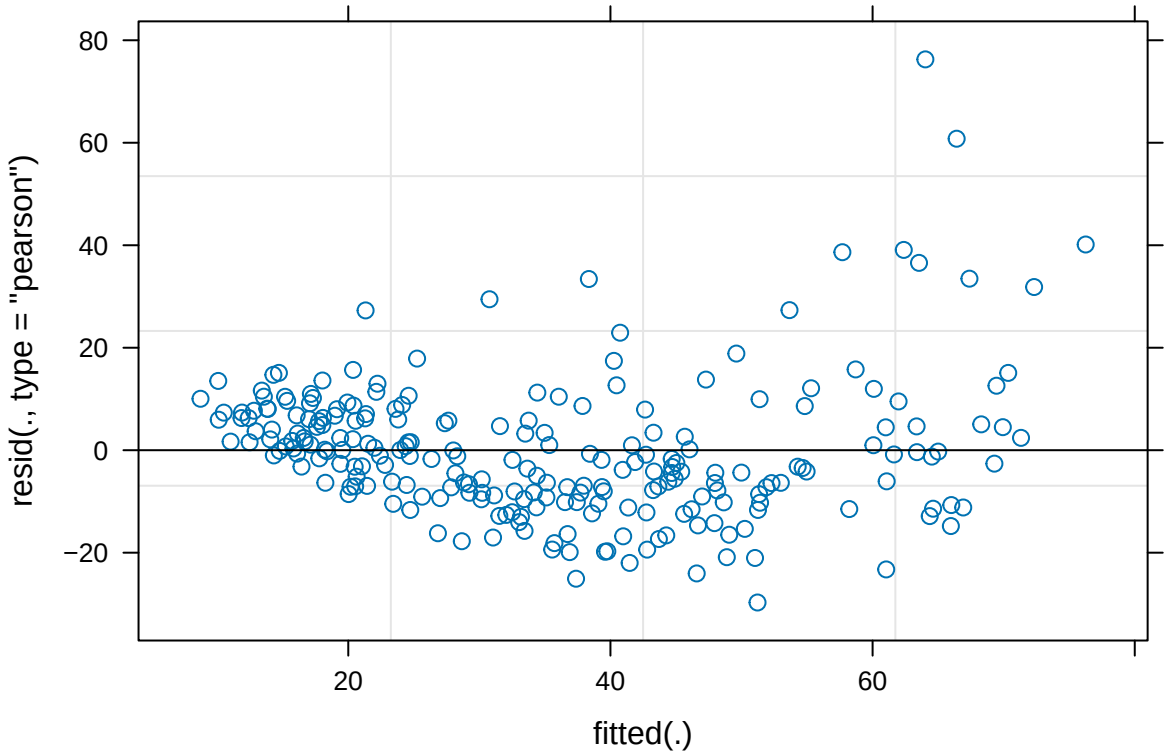
```r
#glmm assuming out of 100 points and random effect for block
m2 <- lmer(AvVegHeight ~ Year.s + VegTrt * SeedTrt + (1|Block),
           #family = binomial,
           data = SumMust_Height)
```

```
## fixed-effect model matrix is rank deficient so dropping 4 columns / coefficients
```

```r
summary(m2)
```

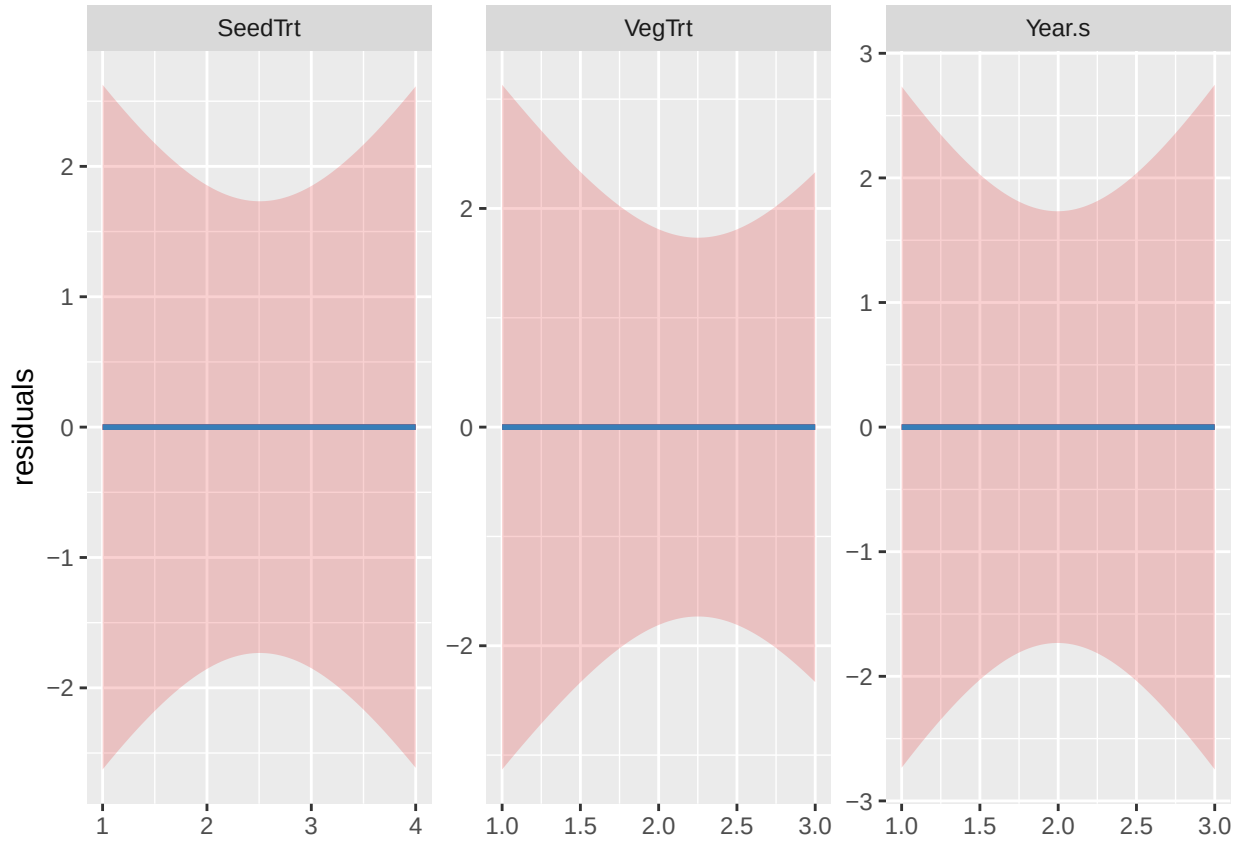
```
## Linear mixed model fit by REML ['lmerMod']
## Formula: AvVegHeight ~ Year.s + VegTrt * SeedTrt + (1 | Block)
##    Data: SumMust_Height
##
## REML criterion at convergence: 1904.3
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.1201 -0.5931 -0.0771  0.4485  5.4408
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  Block    (Intercept)  17.48    4.181
##  Residual             196.52   14.019
## Number of obs: 239, groups:  Block, 10
##
## Fixed effects:
##                   Estimate Std. Error t value
## (Intercept)         24.221      3.153   7.682
## Year.s2             -4.206      2.217  -1.897
## Year.s3             26.649      2.224  11.983
## VegTrtS             13.103      3.652   3.588
## VegTrtU             18.036      3.620   4.983
## SeedTrtM           -21.292      3.620  -5.882
## SeedTrtMS          -23.258      3.620  -6.426
## SeedTrtS            -6.998      3.620  -1.933
## VegTrtS:SeedTrtS    -2.696      5.142  -0.524
## VegTrtU:SeedTrtS     1.088      5.119   0.213
##
## Correlation of Fixed Effects:
##             (Intr) Yer.s2 Yer.s3 VgTrtS VgTrtU SdTrtM SdTrMS SdTrtS VTS:ST
## Year.s2     -0.352
## Year.s3     -0.352  0.498
## VegTrtS     -0.572  0.000  0.011
## VegTrtU     -0.574  0.000  0.000  0.496
## SeedTrtM     0.000  0.000  0.000  0.000 -0.500
## SeedTrtMS    0.000  0.000  0.000  0.000 -0.500  0.500
## SeedTrtS    -0.574  0.000  0.000  0.496  0.500  0.000  0.000
## VgTrtS:SdTS  0.406  0.000 -0.008 -0.710 -0.352  0.000  0.000 -0.704
## VgTrtU:SdTS  0.406  0.000  0.000 -0.350 -0.707  0.354  0.354 -0.707  0.498
## fit warnings:
## fixed-effect model matrix is rank deficient so dropping 4 columns / coefficients
```

```r
# residual plot
plot(m2)
```




```
plot_model(m2, type = "resid")
```

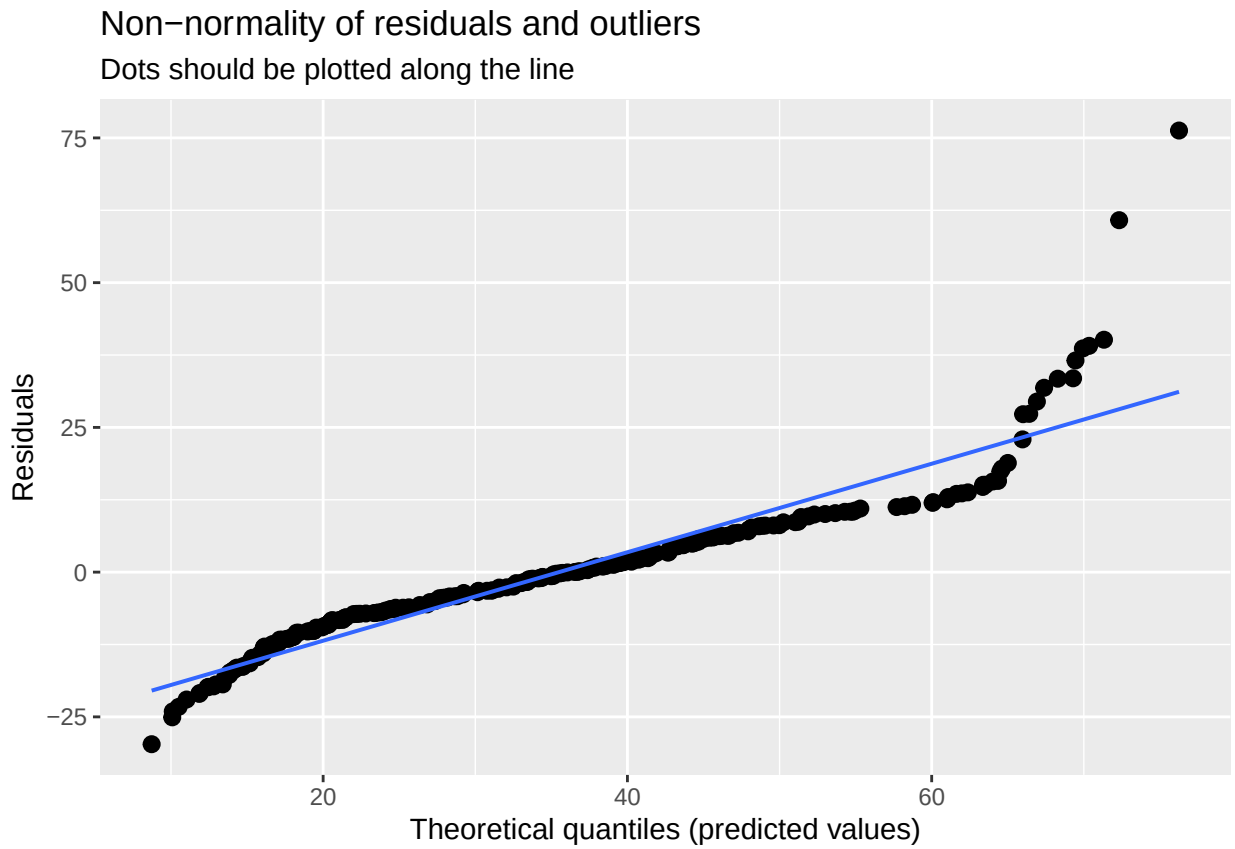
```
## `geom_smooth()` using formula = 'y ~ x'
## `geom_smooth()` using formula = 'y ~ x'
```




```
plot_model(m2, type = "diag")
```

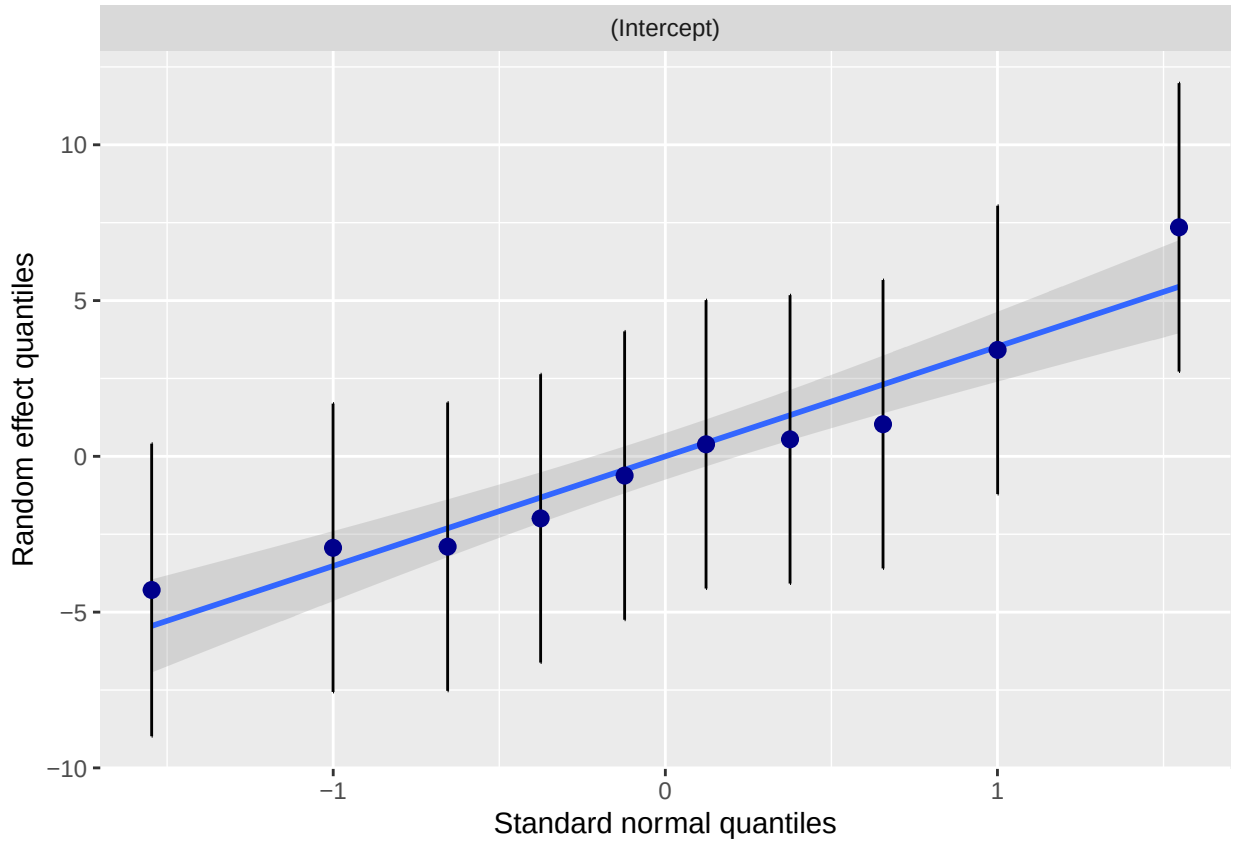
```
## [[1]]
```

```
## `geom_smooth()` using formula = 'y ~ x'
```

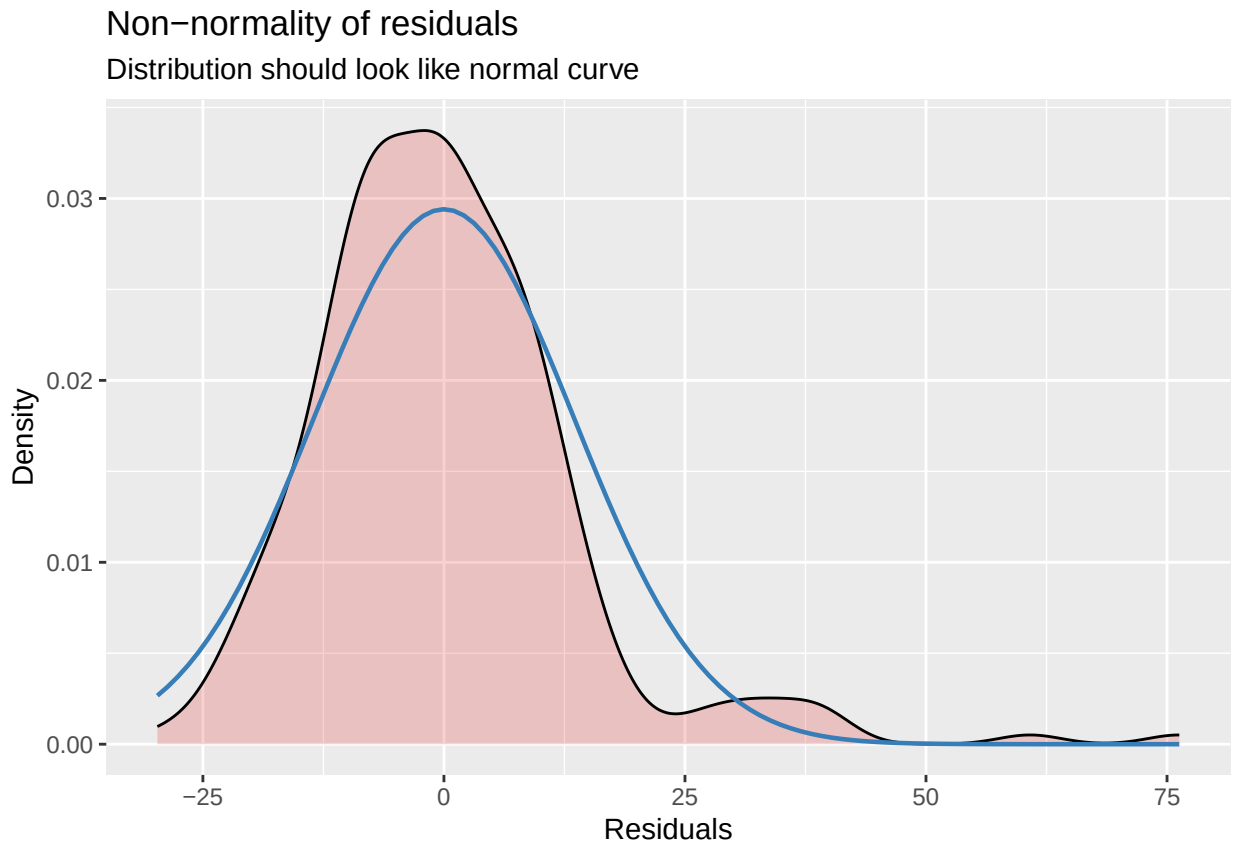



```
##
## [[2]]
## [[2]]$Block
```

```
## `geom_smooth()` using formula = 'y ~ x'
```

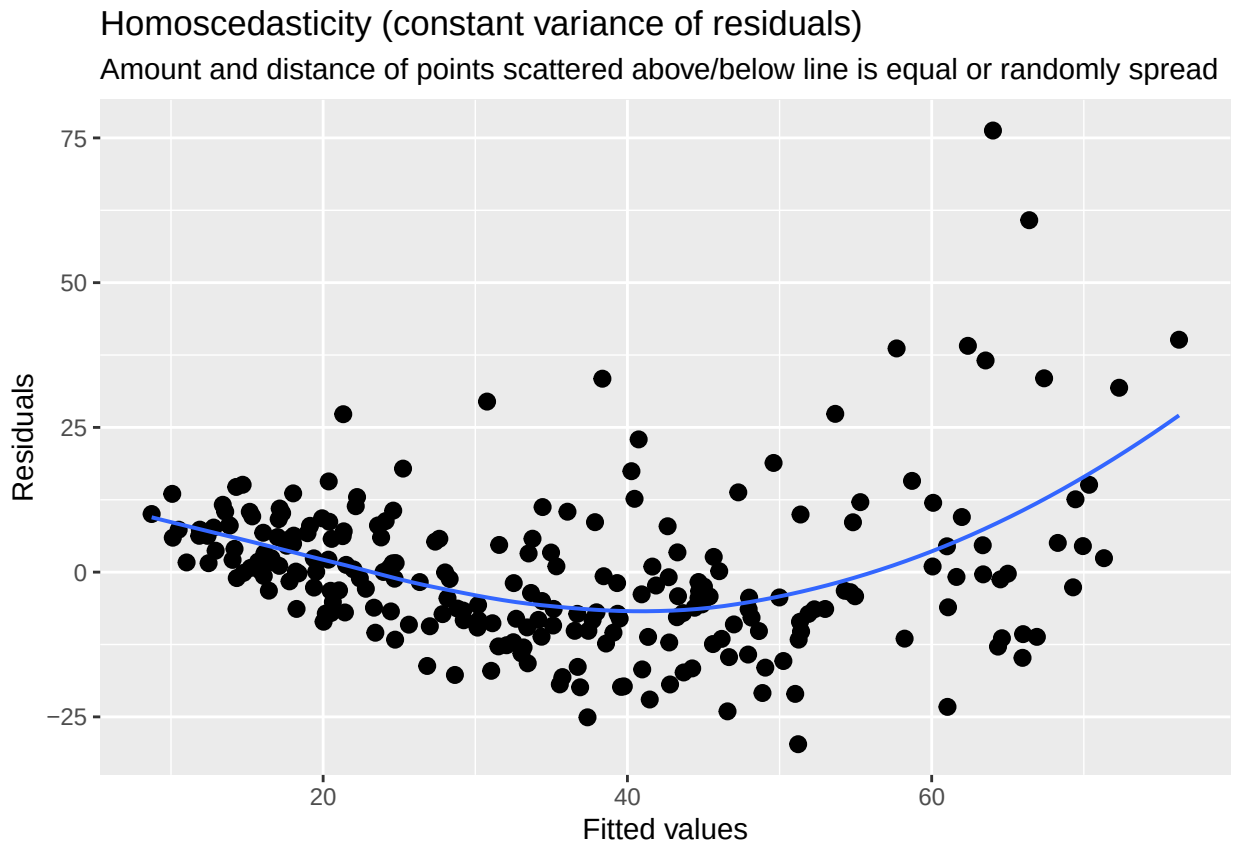

(Intercept)
Random effect quantiles
10
5
0
−5
−10
−1
0
1
Standard normal quantiles

```
##
##
## [[3]]
```

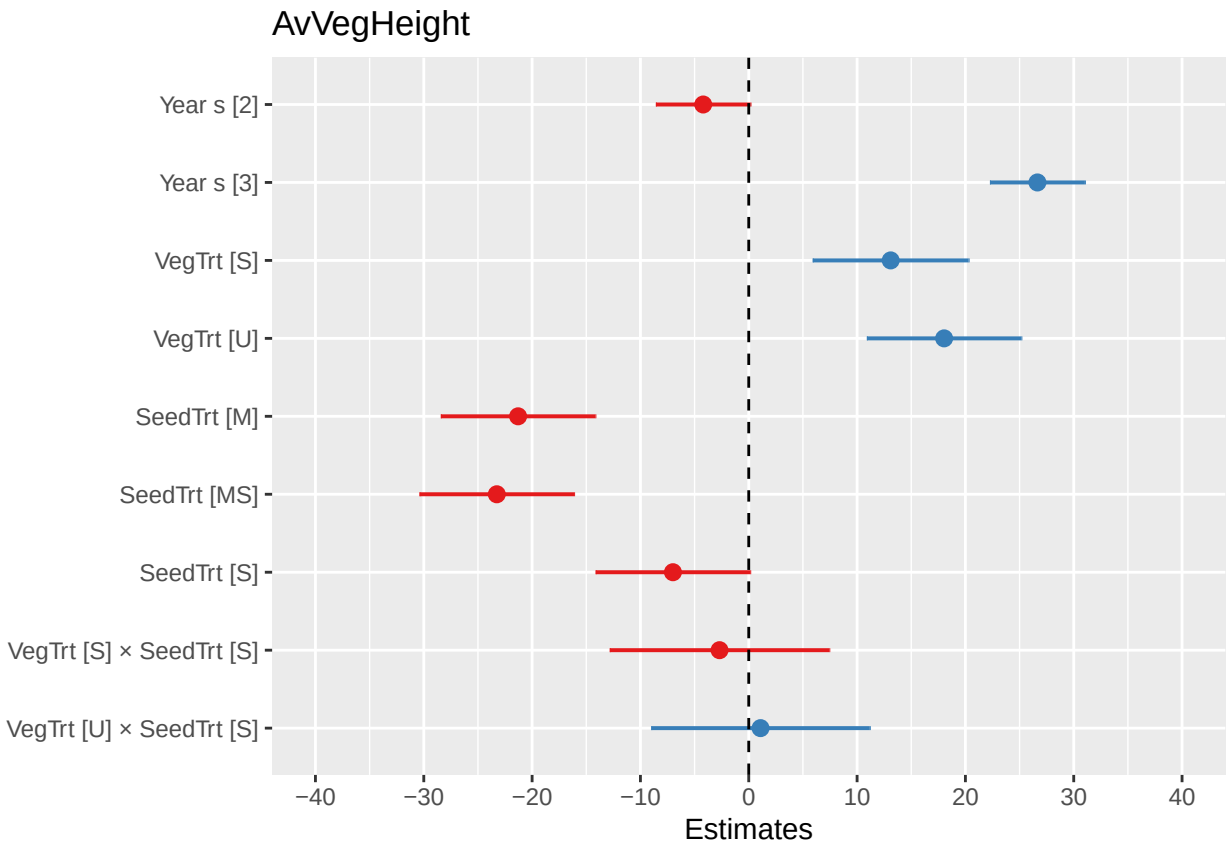



```
##
## [[4]]
```

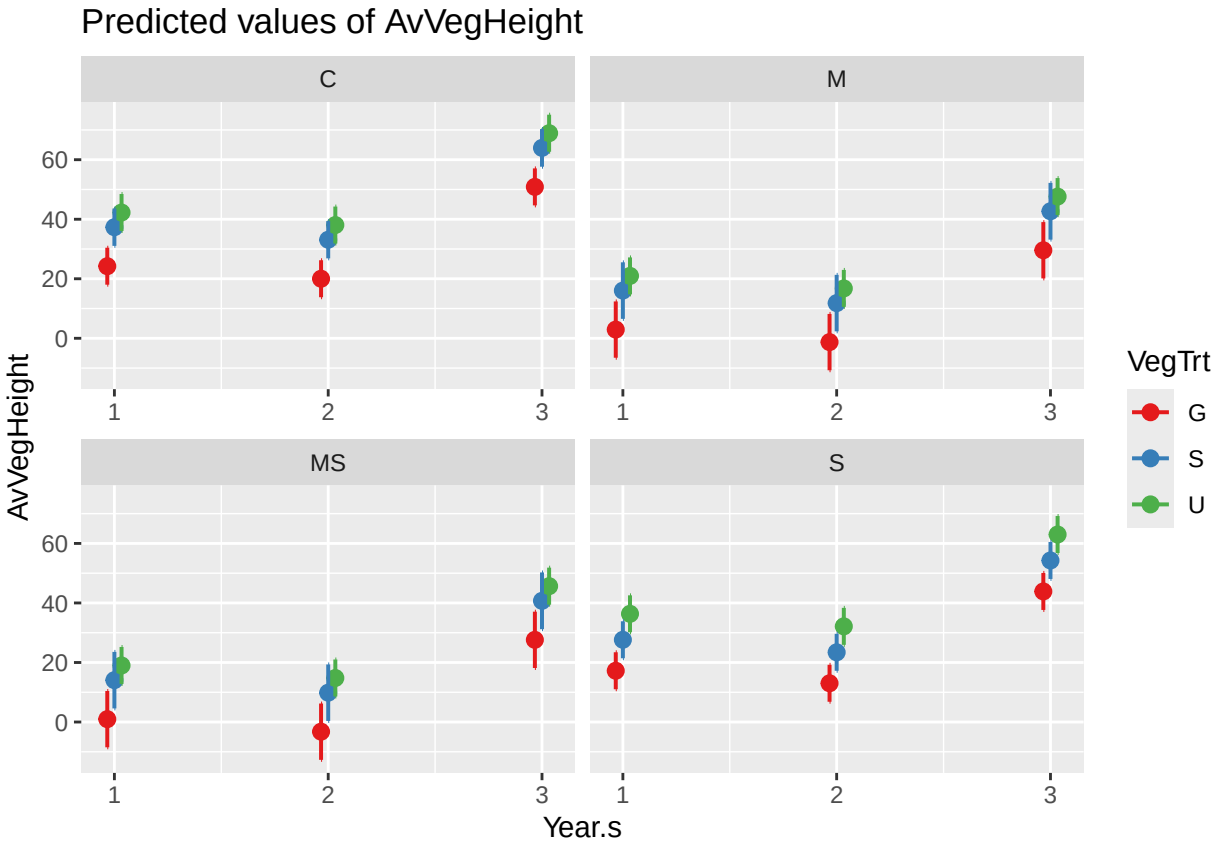
```
## `geom_smooth()` using formula = 'y ~ x'
```




```
#forest plot
plot_model(m2) +
  geom_hline(yintercept = 0, linetype = 2)
```




```
#interaction plot
plot_model(m2, type = "pred", terms = c("Year.s", "VegTrt", "SeedTrt"))
```


Predicted values of AvVegHeight
C
M
MS
S
AvVegHeight
Year.s
VegTrt
G
S
U
0
20
40
60
1
2
3