Mustard

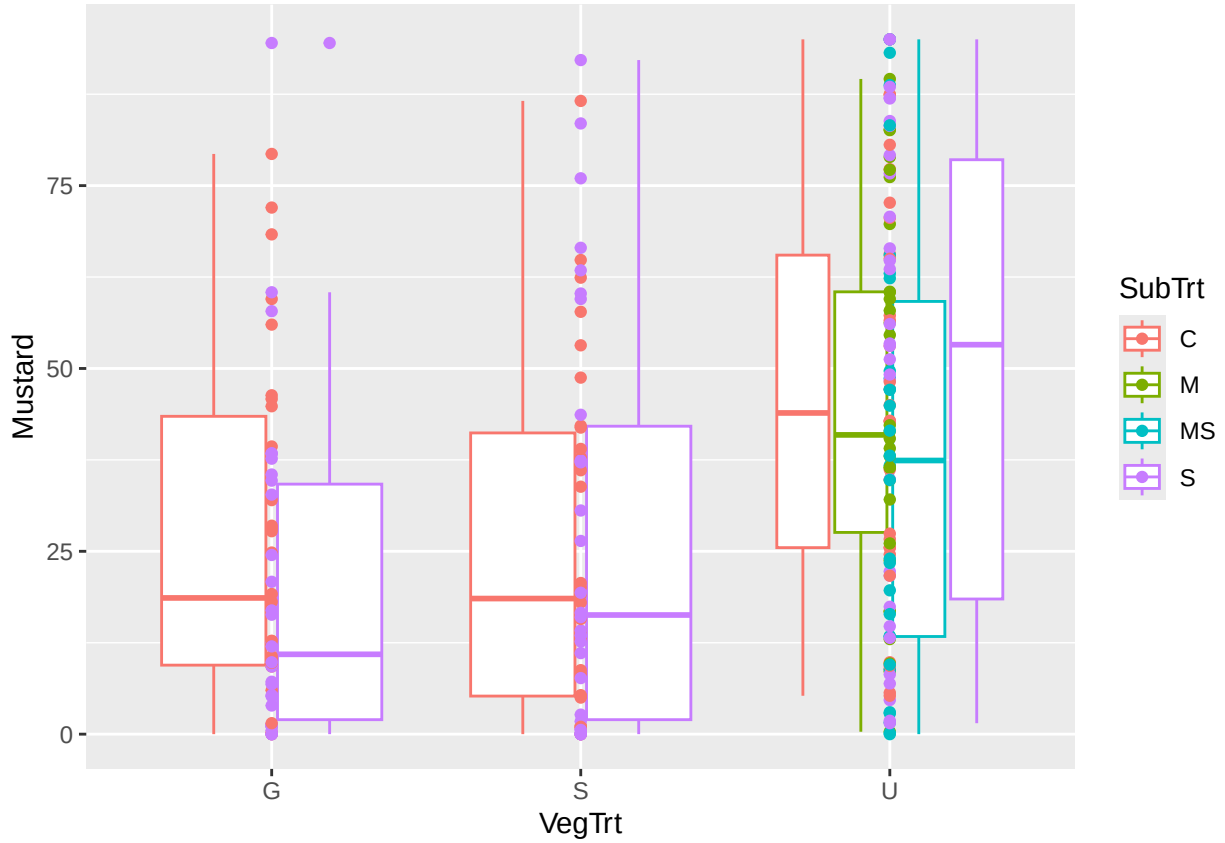
2024-11-26

```
library(tidyverse)
library(readr)
library(readxl)
library(vegan)
library(ggordiplots)
library(ggrepel)
library(cowplot)
library(lme4)
library(glmmTMB)
library(sjPlot)
library(broom)

#import
SumMust <- read_excel("Data/SumMust_long.xlsx")

#setup data types
SumMust$Year.s <- as.factor(SumMust$Year-2021)
SumMust$Mustard.r <- as.integer(round(SumMust$Mustard))
SumMust$VegTrt <- as.factor(SumMust$VegTrt)
SumMust$SubTrt <- as.factor(SumMust$SubTrt)

#plot
ggplot(SumMust, aes(VegTrt, Mustard, color = SubTrt)) +
  geom_boxplot() +
  geom_point()
```



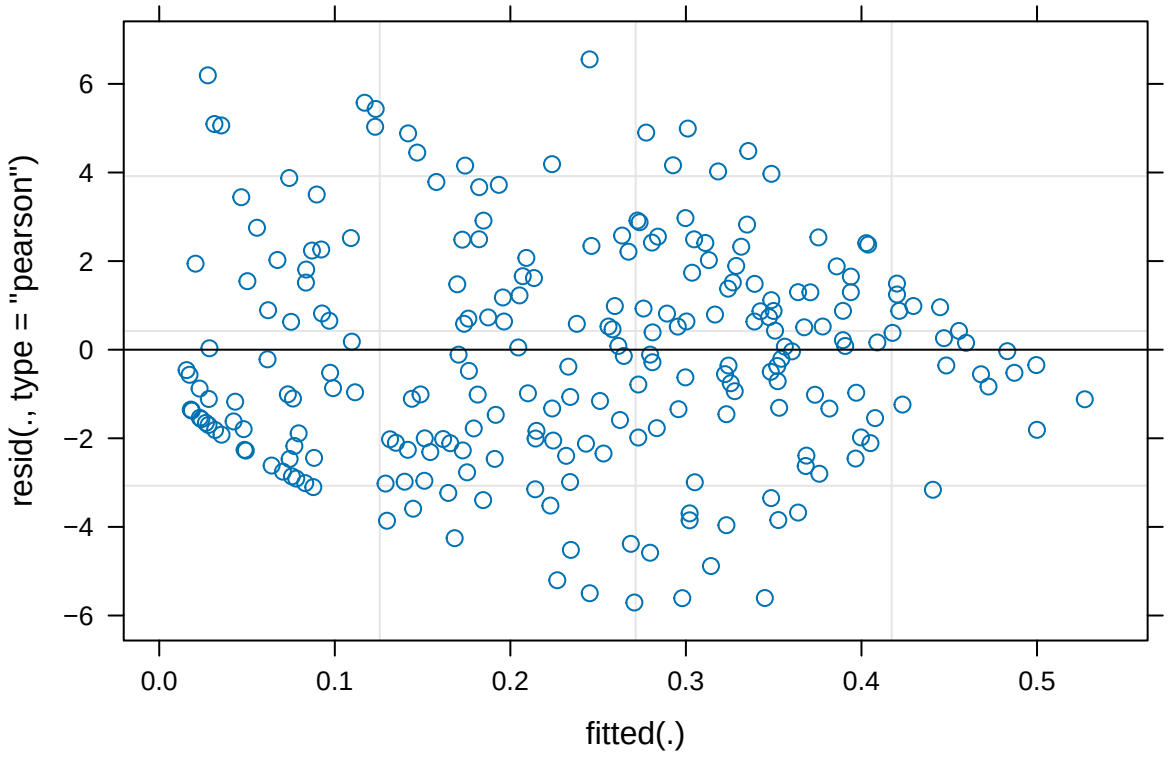

```
#glmm assuming out of 100 points and random effect for block
m1 <- glmer(cbind(Mustard.r, 100) ~ Year.s * VegTrt * SubTrt + (1|Block),
            family = binomial,
            data = SumMust)
```

```
## fixed-effect model matrix is rank deficient so dropping 12 columns / coefficients
```

```
summary(m1)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: cbind(Mustard.r, 100) ~ Year.s * VegTrt * SubTrt + (1 | Block)
##    Data: SumMust
##
##      AIC      BIC   logLik deviance df.resid
##   2757.5   2844.5  -1353.8   2707.5      215
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.7064 -1.9807 -0.3512  1.4881  6.5536
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  Block  (Intercept) 0.04947  0.2224
## Number of obs: 240, groups:  Block, 10
##
```

```
## Fixed effects:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -2.819154   0.149632 -18.841  < 2e-16 ***
## Year.s2                   1.982498   0.143971  13.770  < 2e-16 ***
## Year.s3                   1.530980   0.148458  10.313  < 2e-16 ***
## VegTrtS                   0.435884   0.170008   2.564  0.01035 *
## VegTrtU                   1.472755   0.149123   9.876  < 2e-16 ***
## SubTrtM                  -0.257598   0.103546  -2.488  0.01285 *
## SubTrtMS                 -0.983061   0.125901  -7.808 5.80e-15 ***
## SubTrtS                  -1.027704   0.252828  -4.065 4.81e-05 ***
## Year.s2:VegTrtS          -0.526820   0.188778  -2.791  0.00526 **
## Year.s3:VegTrtS          -0.575028   0.196335  -2.929  0.00340 **
## Year.s2:VegTrtU          -1.338543   0.168844  -7.928 2.23e-15 ***
## Year.s3:VegTrtU          -0.731217   0.171980  -4.252 2.12e-05 ***
## Year.s2:SubTrtM           0.541141   0.127371   4.249 2.15e-05 ***
## Year.s3:SubTrtM           0.076444   0.128670   0.594  0.55244
## Year.s2:SubTrtMS          1.198932   0.146466   8.186 2.71e-16 ***
## Year.s3:SubTrtMS          0.704277   0.147954   4.760 1.93e-06 ***
## Year.s2:SubTrtS           0.820828   0.266406   3.081  0.00206 **
## Year.s3:SubTrtS           0.653516   0.273363   2.391  0.01682 *
## VegTrtS:SubTrtS           0.006183   0.325337   0.019  0.98484
## VegTrtU:SubTrtS           0.177797   0.280387   0.634  0.52601
## Year.s2:VegTrtS:SubTrtS   0.487766   0.345275   1.413  0.15775
## Year.s3:VegTrtS:SubTrtS   0.394066   0.355889   1.107  0.26818
## Year.s2:VegTrtU:SubTrtS   0.421627   0.301680   1.398  0.16223
## Year.s3:VegTrtU:SubTrtS   0.272688   0.307832   0.886  0.37571
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation matrix not shown by default, as p = 24 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
## fit warnings:
## fixed-effect model matrix is rank deficient so dropping 12 columns / coefficients
# residual plot
plot(m1)
```




```
plot_model(m1, type = "resid")
```

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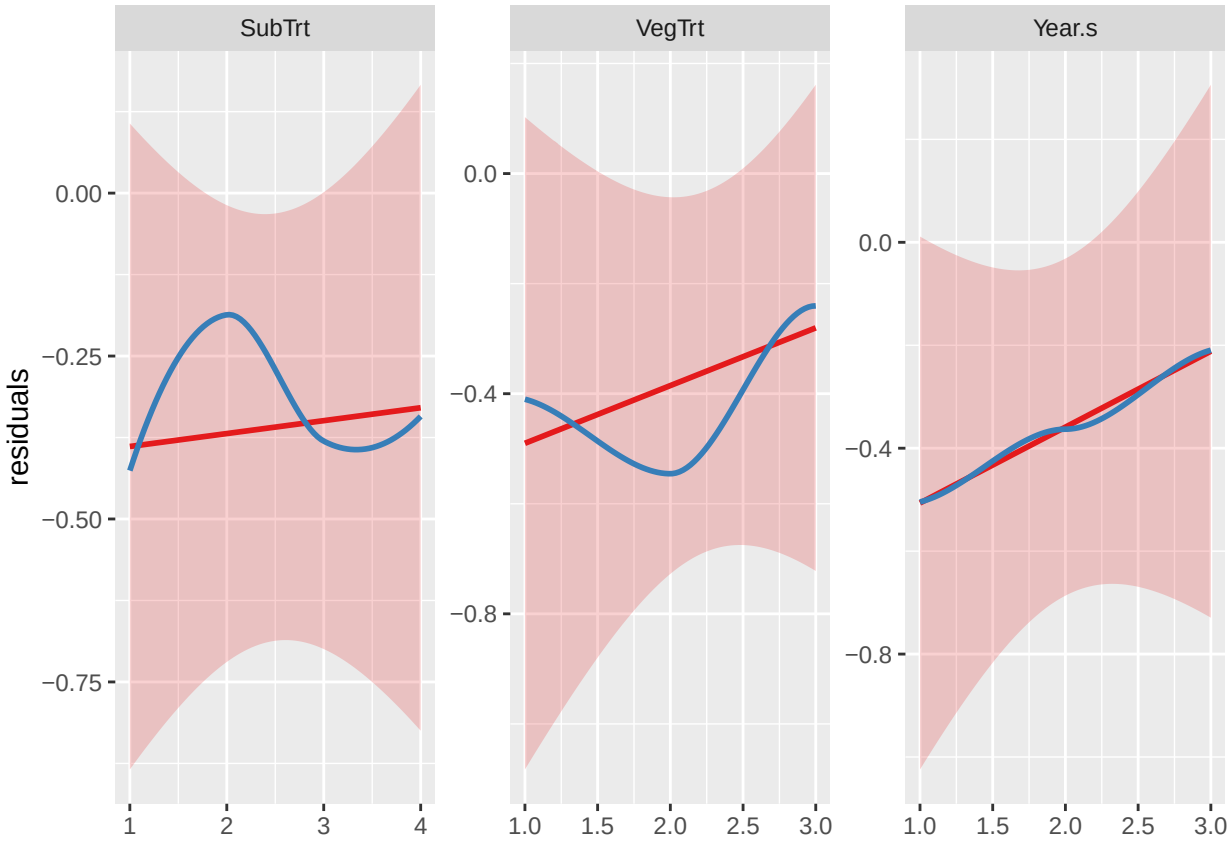
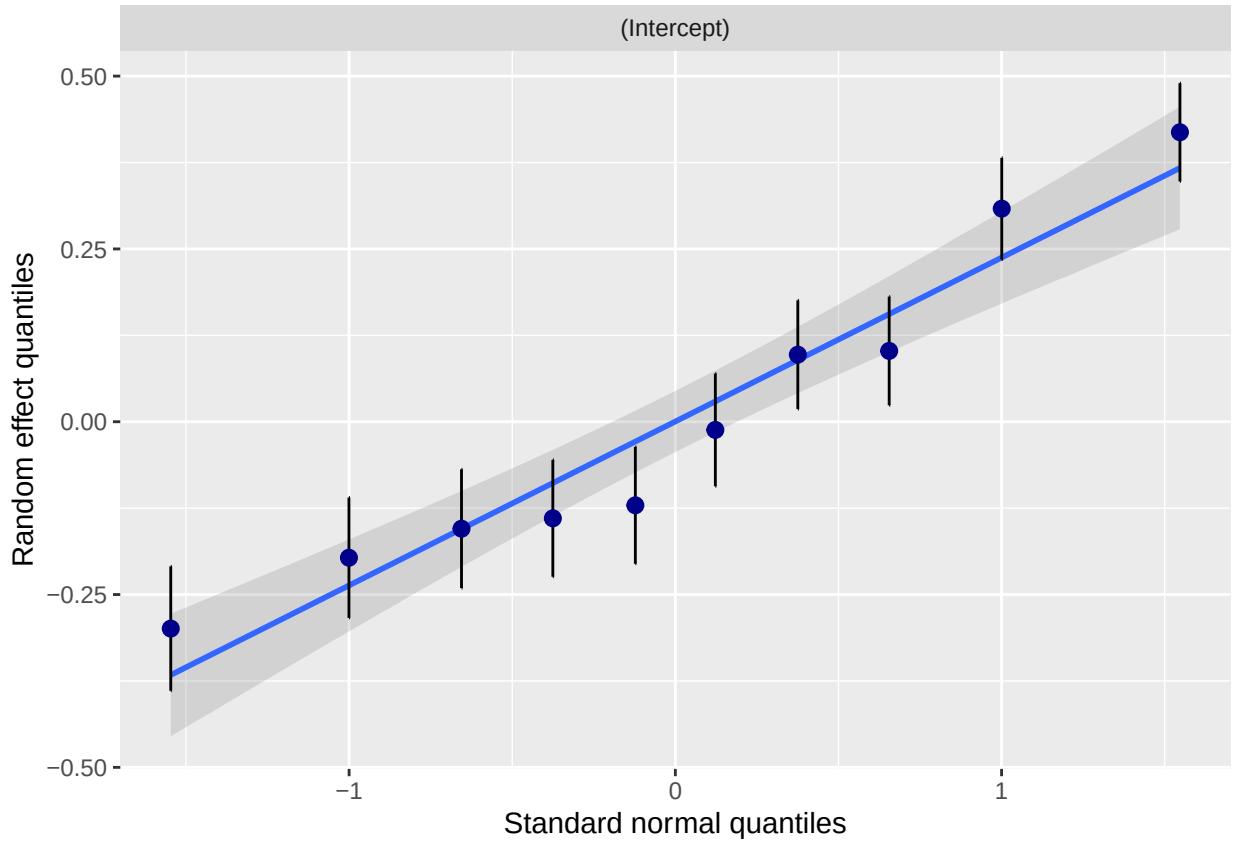



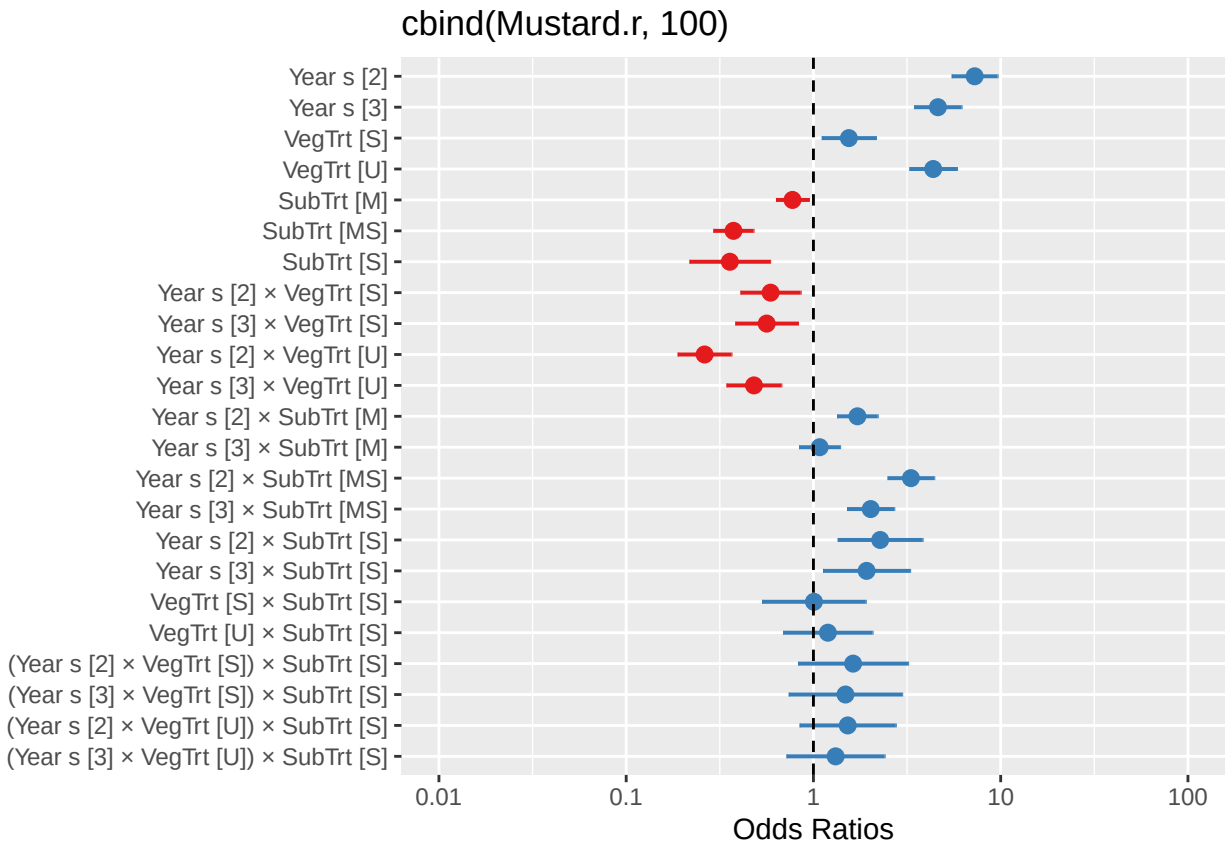

```
plot_model(m1, type = "diag")
```

```
## $Block
```

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

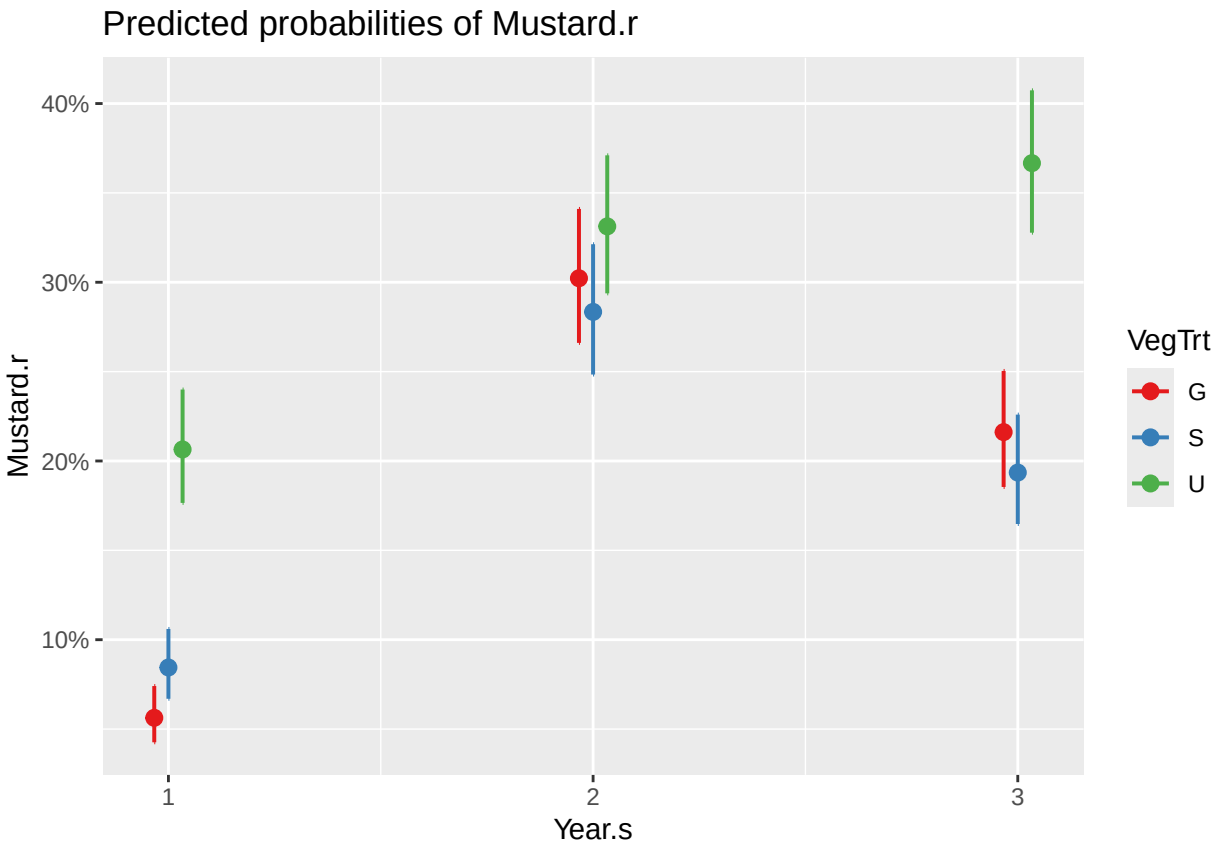



```
#forest plot
plot_model(m1) +
  geom_hline(yintercept = 1, linetype = 2)
```

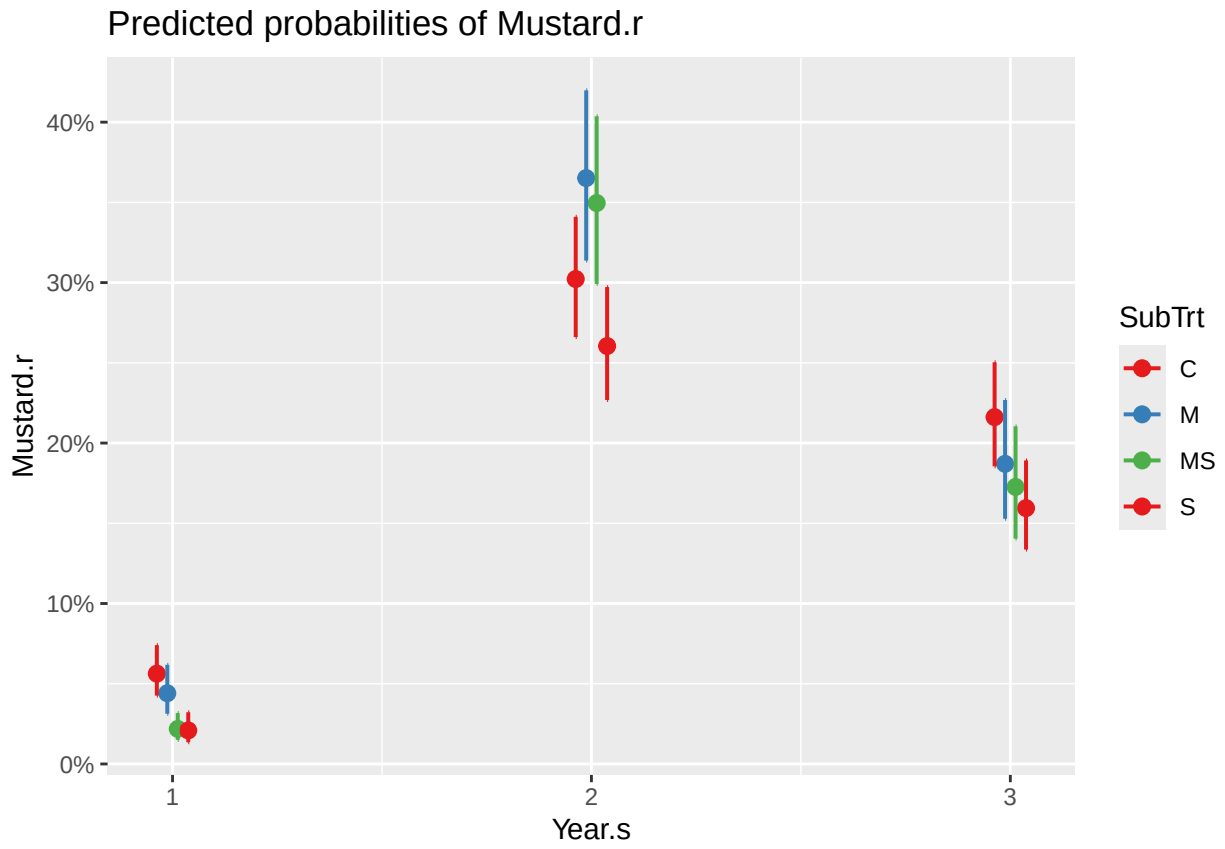



```
#interaction plot
plot_model(m1, type = "int", terms = c("VegTrt", "SubTrt"))
```

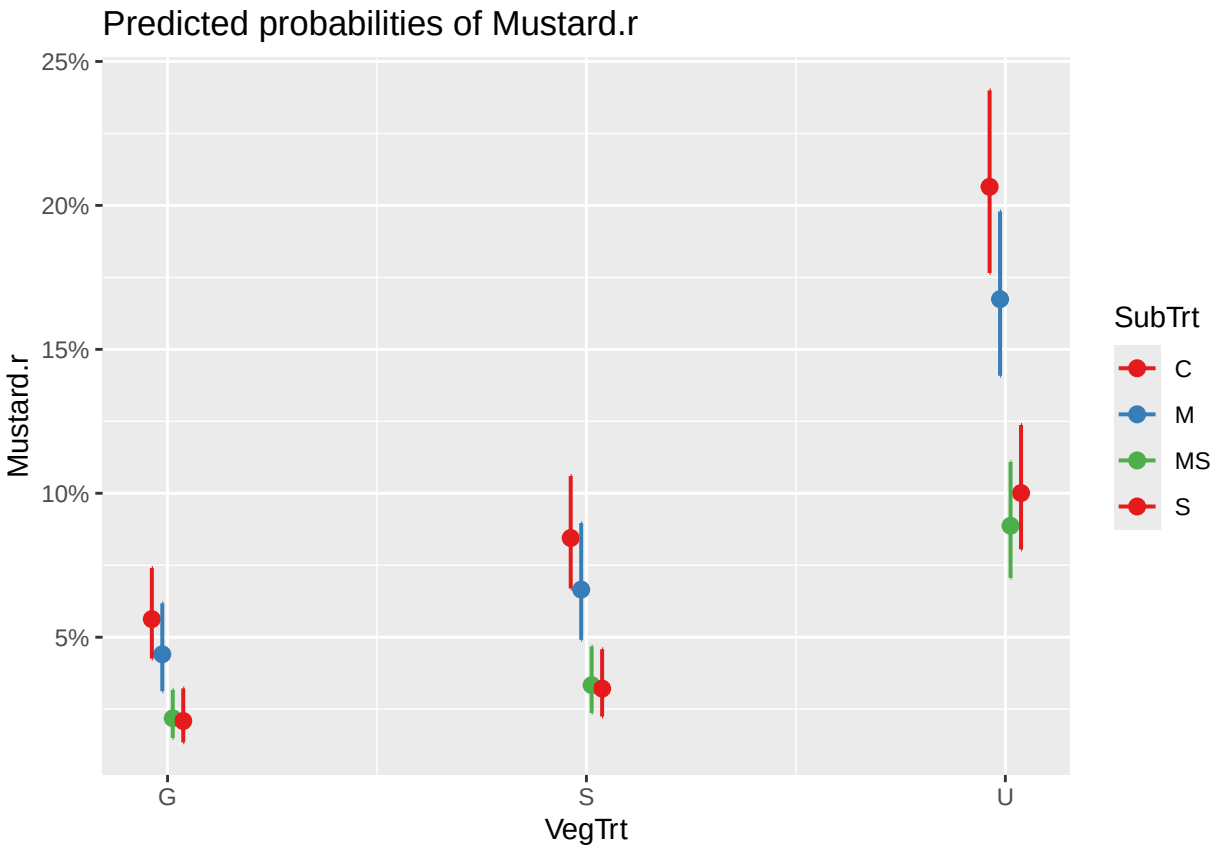
```
## [[1]]
```


Predicted probabilities of Mustard.r
40%
30%
20%
10%
Mustard.r
1
2
3
Year.s
VegTrt
G
S
U

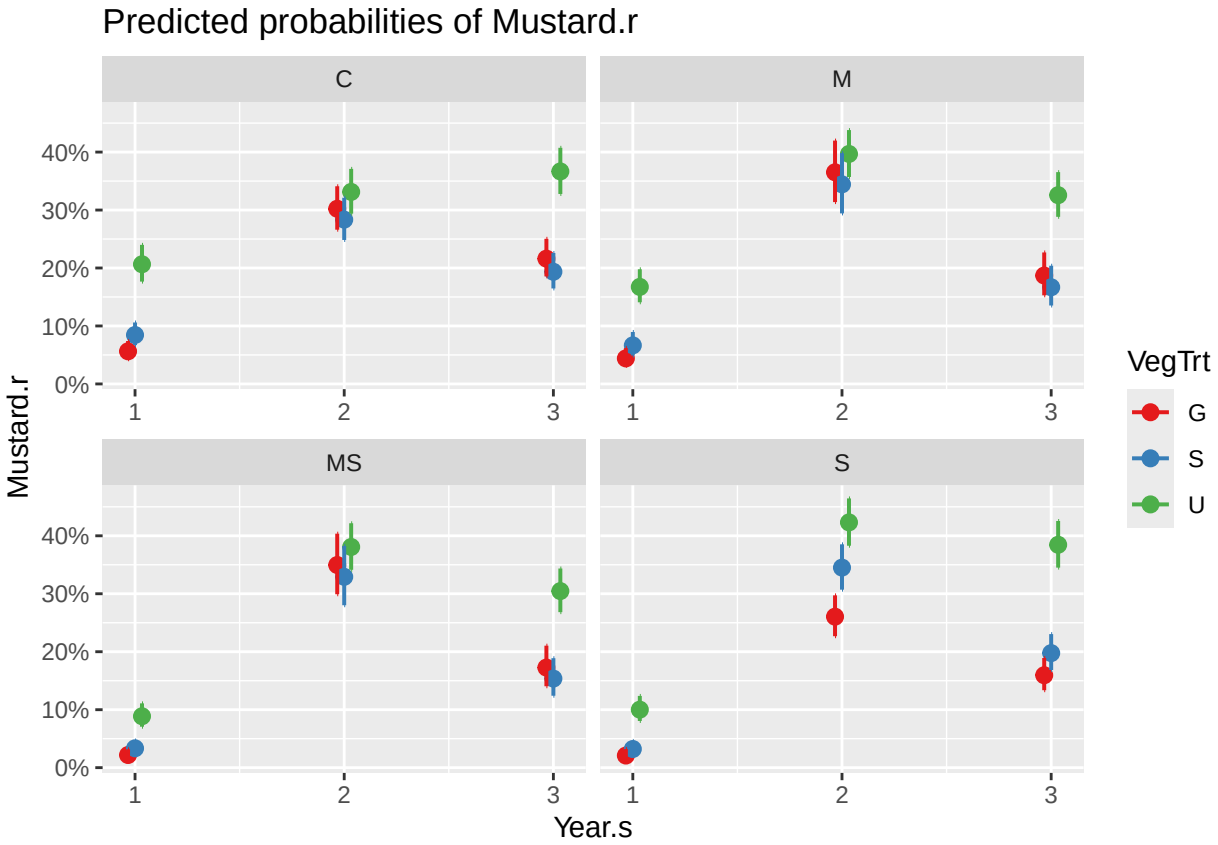
```
##
## [[2]]
```


Predicted probabilities of Mustard.r
40%
30%
20%
10%
0%
Mustard.r
1
2
3
Year.s
SubTrt
C
M
MS
S

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


Predicted probabilities of Mustard.r
25%
20%
15%
10%
5%
Mustard.r
G
S
U
VegTrt
SubTrt
C
M
MS
S

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


Predicted probabilities of Mustard.r
C
M
MS
S
40%
30%
20%
10%
0%
1
2
3
Mustard.r
Year.s
VegTrt
G
S
U