

In Vitro Aphid Choice UV

Contents

Load Libraries	1
Load Data	1
Summarize aphid counts	1
Calculate percent aphid counts and deviations from 50%	2
Plots	2
4 Hour Alate Choice	2
24 Hour Alate Choice	5

Load Libraries

```
pacman::p_load(ggplot2, readxl, ggbeeswarm, readr, dplyr, tidyr, tidyverse, devtools,
               cowplot, knitr, emmeans, lme4, lmerTest, RColorBrewer, viridis, install = FALSE)
```

Load Data

```
aphid_choice_raw <- read_excel("data/alate_choice_in_vitro.xlsx") %>%
  mutate(block = as.factor(block))
```

Summarize aphid counts

```
aphid_choice_sum <- aphid_choice_raw %>%
  group_by(block, treatment, box, UV) %>%
  summarize(total_alates_4_hrs = sum(alates_4_hrs), total_nymphs_4_hrs = sum(nymphs_4_hrs),
            total_alates_24_hrs = sum(alates_24_hrs), total_nymphs_24_hrs = sum(nymphs_24_hrs),
            .groups = "drop")

# reshape

aphid_choice_sum <- aphid_choice_sum %>%
  pivot_wider(names_from = treatment, values_from = c(total_alates_4_hrs, total_nymphs_4_hrs,
```

```

total_alates_24_hrs, total_nymphs_24_hrs), names_glue = "{.value}_{treatment}") %>%
select(block, box, UV, alates_220_supernatant_4_hrs = total_alates_4_hrs_220_supernatant,
      alates_PPM_4_hrs = total_alates_4_hrs_PPM, nymphs_220_supernatant_4_hrs = total_nymphs_4_hrs_220,
      nymphs_PPM_4_hrs = total_nymphs_4_hrs_PPM, alates_220_supernatant_24_hrs = total_alates_24_hrs_220,
      alates_PPM_24_hrs = total_alates_24_hrs_PPM, nymphs_220_supernatant_24_hrs = total_nymphs_24_hrs_220,
      nymphs_PPM_24_hrs = total_nymphs_24_hrs_PPM) %>%
mutate(sum_alates_4_hrs = alates_220_supernatant_4_hrs + alates_PPM_4_hrs, sum_nymphs_4_hrs = nymphs_220_supernatant_4_hrs + nymphs_PPM_4_hrs,
      sum_alates_24_hrs = alates_220_supernatant_24_hrs + alates_PPM_24_hrs,
      sum_nymphs_24_hrs = nymphs_220_supernatant_24_hrs + nymphs_PPM_24_hrs, total_alates_10_or_more =
      10, "yes", "no")) %>%
filter(sum_alates_4_hrs >= 5)

```

Calculate percent aphid counts and deviations from 50%

```

# separate by box calculate percents
aphid_choice_percent_box <- aphid_choice_sum %>%
  group_by(block, box, UV, total_alates_10_or_more) %>%
  summarize(percent_choice_4hrs = (100 * (alates_220_supernatant_4_hrs/sum_alates_4_hrs)),
            percent_choice_24hrs = (100 * (alates_220_supernatant_24_hrs/sum_alates_24_hrs)),
            percent_nymphs_4hrs = (100 * (nymphs_220_supernatant_4_hrs/sum_nymphs_4_hrs)),
            percent_nymphs_24hrs = (100 * (nymphs_220_supernatant_24_hrs/sum_nymphs_24_hrs)),
            ) %>%
  mutate(percent_diff_from_50_4hrs = percent_choice_4hrs - 50, percent_diff_from_50_24hrs = percent_choice_24hrs - 50,
         # Calculate the difference from 50%
         )

```

`summarise()` has grouped output by 'block', 'box', 'UV'. You can override
using the `.groups` argument.

```

# Calculate the mean for UV and no UV groups
aphid_choice_mean <- aphid_choice_percent_box %>%
  group_by(UV) %>%
  summarise(mean_percent_diff_from_50_4hrs = mean(percent_diff_from_50_4hrs, na.rm = TRUE),
            mean_percent_diff_from_50_24hrs = mean(percent_diff_from_50_24hrs, na.rm = TRUE)) %>%
  ungroup()

```

Plots

4 Hour Alate Choice

```

# remove block 1
aphid_choice_percent_box_no_block1 <- aphid_choice_percent_box %>%
  filter(block != "1")

#plot it!
ggplot(aphid_choice_percent_box_no_block1, aes(x = block, y = percent_diff_from_50_4hrs, fill = UV, group = UV)) +
  geom_col(position = position_dodge(width = 1), color = "black", size = 0.3) + # Dodge bars by both block and UV
  scale_y_continuous(limits = c(-50, 50), # Set y-axis from -50% to +50% (around 50%)

```

```

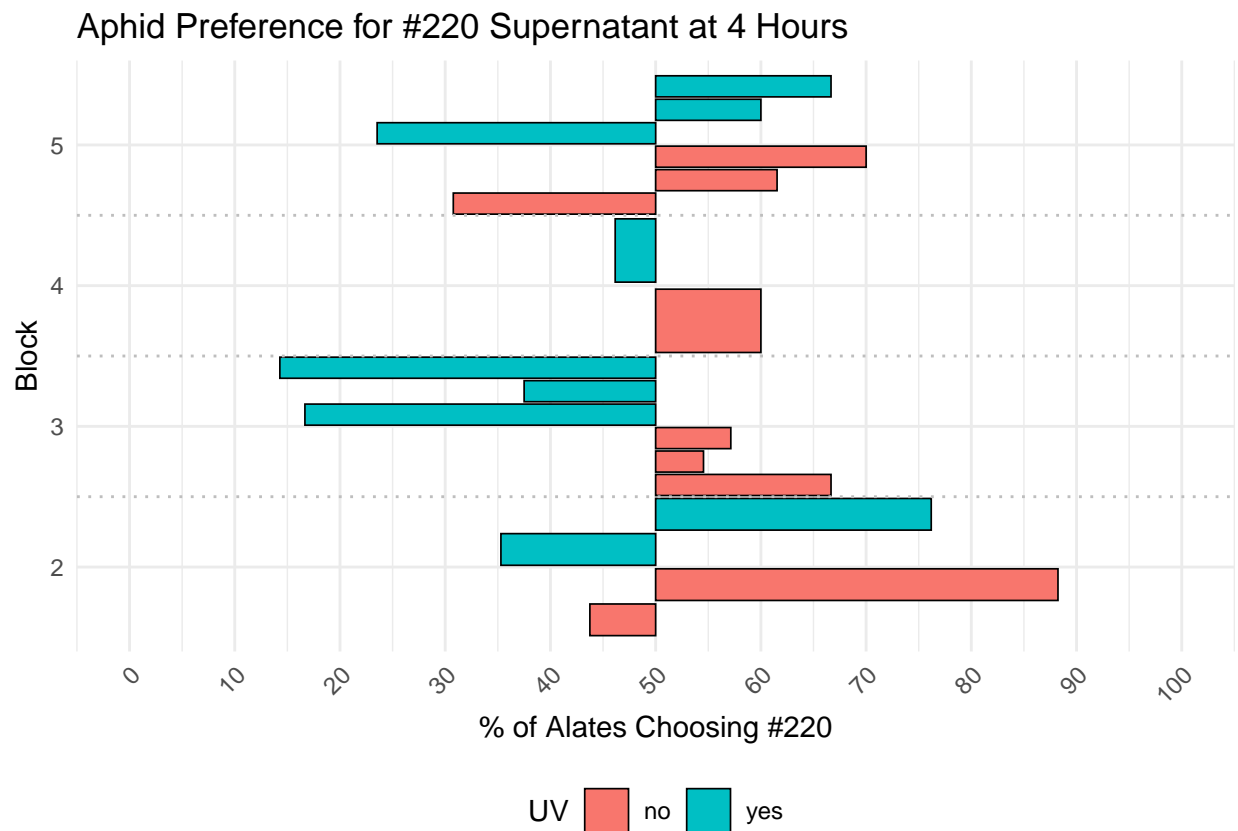
      breaks = seq(-50, 50, 10), # Customize y-axis breaks
      labels = c("0", "10", "20", "30", "40", "50", "60", "70", "80", "90", "100")) + #
coord_flip() + # Flip coordinates so the bars are horizontal
theme_minimal() + # Use minimal theme
labs(x = "Block",
     y = "% of Alates Choosing #220",
     title = "Aphid Preference for #220 Supernatant at 4 Hours") +
geom_hline(yintercept = 0, color = "white", alpha = 0) + # Add a horizontal line at 50%
theme(axis.text.x = element_text(angle = 45, hjust = 1), # Rotate x-axis text for better readability
      legend.position = "bottom") + # Place legend at the bottom
# Add dotted lines between different block groups
geom_vline(xintercept = seq(1.5, length(unique(aphid_choice_percent_box_no_block1$block)) - 0.5, by =
          linetype = "dotted", color = "grey", size = 0.5) # Dotted lines between blocks

```

```

## Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use `linewidth` instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.

```



```

#-----

#rearrange so all UV is grouped
ggplot(aphid_choice_percent_box_no_block1, aes(x = interaction(block, UV), y = percent_diff_from_50_4hr

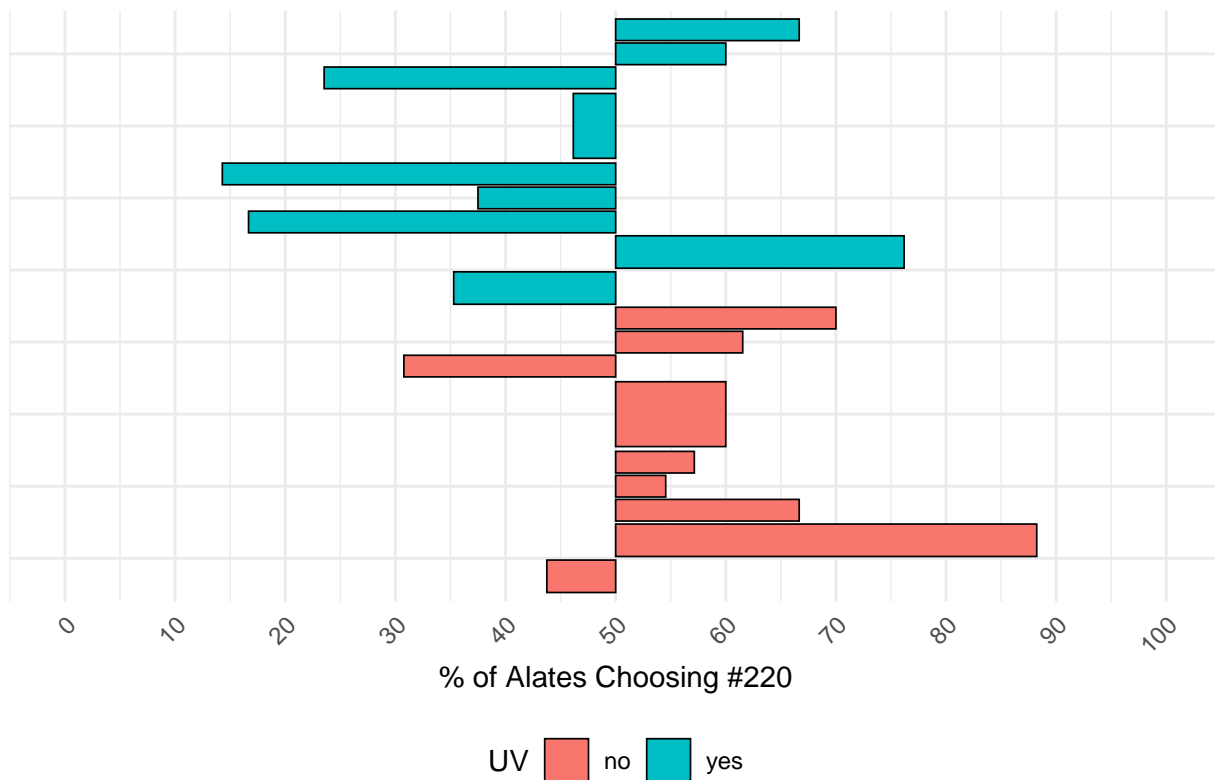
```

```

geom_col(position = position_dodge(width = 1), color = "black", size = 0.3) + # Dodge bars by both b
scale_y_continuous(limits = c(-50, 50), # Set y-axis from -50% to +50% (around 50%)
  breaks = seq(-50, 50, 10), # Customize y-axis breaks
  labels = c("0", "10", "20", "30", "40", "50", "60", "70", "80", "90", "100")) + #
coord_flip() + # Flip coordinates so the bars are horizontal
theme_minimal() + # Use minimal theme
labs(x = NULL,
  y = "% of Alates Choosing #220",
  title = "Aphid Preference for #220 Supernatant at 4 Hours") +
geom_hline(yintercept = 0, color = "white", alpha = 0) + # Add a horizontal line at 50%
theme(axis.text.x = element_text(angle = 45, hjust = 1), # Rotate x-axis text for better readability
  axis.text.y = element_blank(), # Remove y-axis labels
  legend.position = "bottom", # Place legend at the bottom
  axis.ticks.x = element_blank()) # Remove x-axis ticks for a cleaner look

```

Aphid Preference for #220 Supernatant at 4 Hours



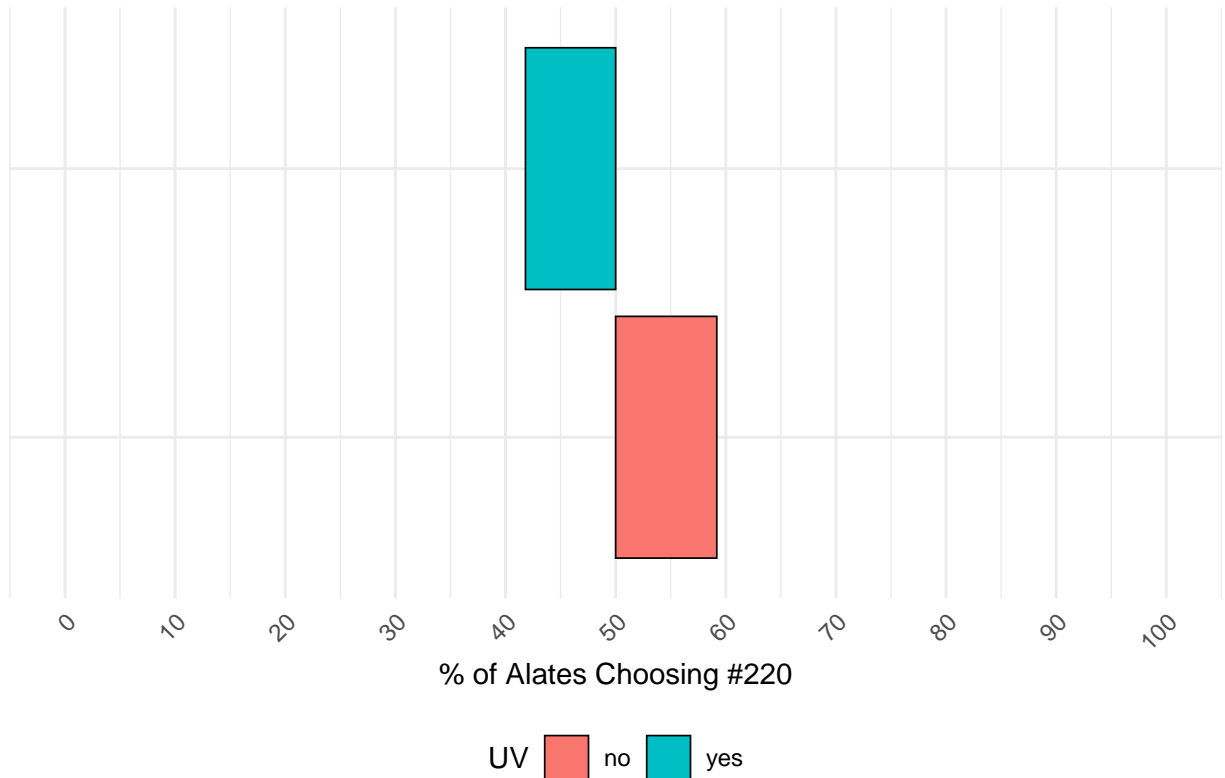
```

#-----
# average across UV/no UV
ggplot(aphid_choice_mean, aes(x = UV, y = mean_percent_diff_from_50_4hrs, fill = UV)) +
  geom_col(position = position_dodge(width = 1), color = "black", size = 0.3) + # Dodge bars by both b
  scale_y_continuous(limits = c(-50, 50), # Set y-axis from -50% to +50% (around 50%)
    breaks = seq(-50, 50, 10), # Customize y-axis breaks
    labels = c("0", "10", "20", "30", "40", "50", "60", "70", "80", "90", "100")) + #
  coord_flip() + # Flip coordinates so the bars are horizontal
  theme_minimal() + # Use minimal theme

```

```
labs(x = NULL,
     y = "% of Alates Choosing #220",
     title = "MEAN Aphid Preference for #220 Supernatant at 4 Hours") +
geom_hline(yintercept = 0, color = "white", alpha = 0) + # Add a horizontal line at 50%
theme(axis.text.x = element_text(angle = 45, hjust = 1), # Rotate x-axis text for better readability
      axis.text.y = element_blank(), # Remove y-axis labels
      legend.position = "bottom", # Place legend at the bottom
      axis.ticks.x = element_blank()) # Remove x-axis ticks for a cleaner look
```

MEAN Aphid Preference for #220 Supernatant at 4 Hours



24 Hour Alate Choice

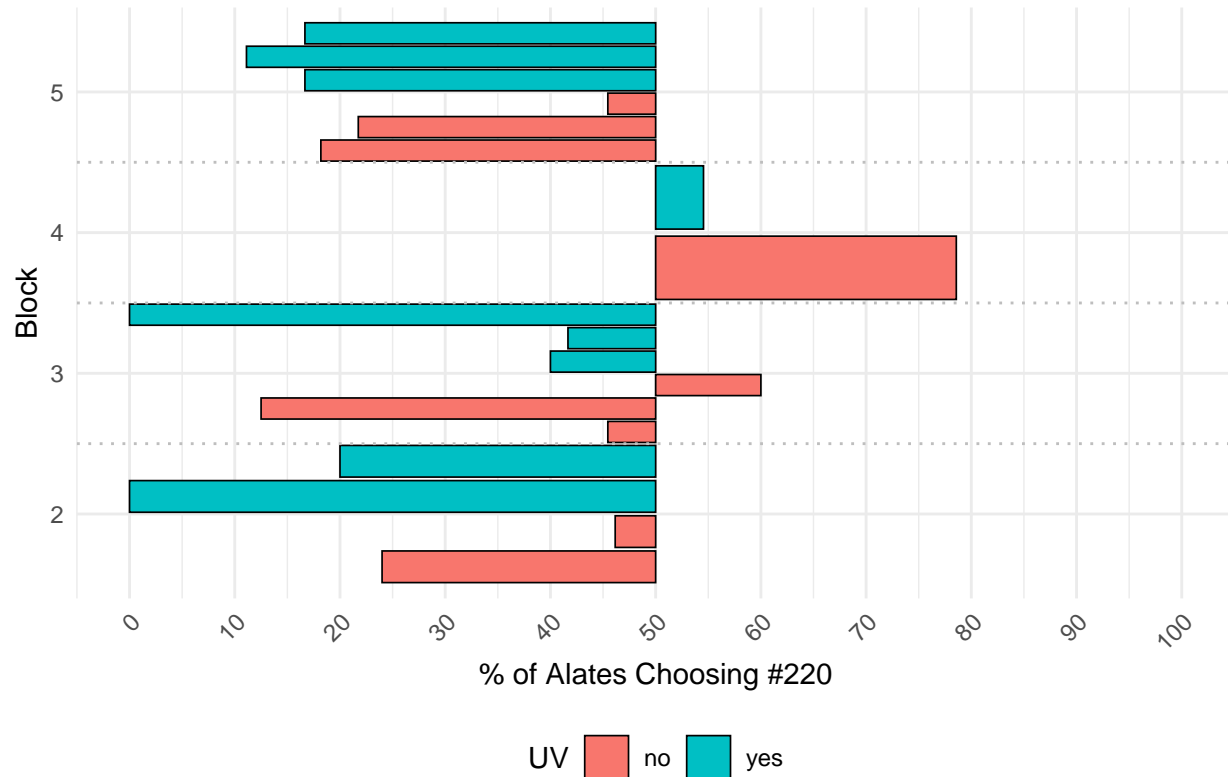
```
#plot it!
ggplot(aphid_choice_percent_box, aes(x = block, y = percent_diff_from_50_24hrs, fill = UV, group = inter)
      geom_col(position = position_dodge(width = 1), color = "black", size = 0.3) + # Dodge bars by both b
      scale_y_continuous(limits = c(-50, 50), # Set y-axis from -50% to +50% (around 50%)
                        breaks = seq(-50, 50, 10), # Customize y-axis breaks
                        labels = c("0", "10", "20", "30", "40", "50", "60", "70", "80", "90", "100")) + #
      coord_flip() + # Flip coordinates so the bars are horizontal
      theme_minimal() + # Use minimal theme
      labs(x = "Block",
           y = "% of Alates Choosing #220",
           title = "Aphid Preference for #220 Supernatant at 24 Hours") +
      geom_hline(yintercept = 0, color = "white", alpha = 0) + # Add a horizontal line at 50%
```

```

theme(axis.text.x = element_text(angle = 45, hjust = 1), # Rotate x-axis text for better readability
      legend.position = "bottom") + # Place legend at the bottom
# Add dotted lines between different block groups
geom_vline(xintercept = seq(1.5, length(unique(aphid_choice_percent_box_no_block1$block)) - 0.5, by =
          linetype = "dotted", color = "grey", size = 0.5) # Dotted lines between blocks

```

Aphid Preference for #220 Supernatant at 24 Hours



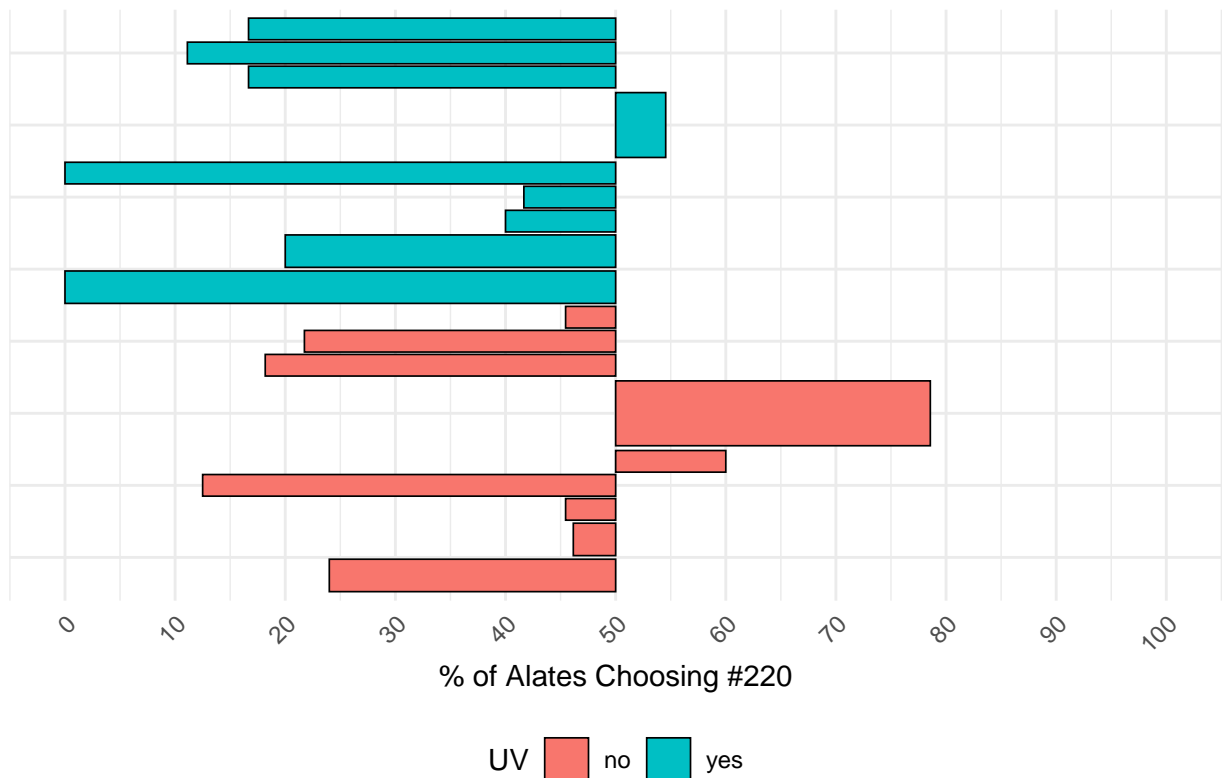
```

#-----

#rearrange so all UV is grouped
ggplot(aphid_choice_percent_box, aes(x = interaction(block, UV), y = percent_diff_from_50_24hrs, fill =
  geom_col(position = position_dodge(width = 1), color = "black", size = 0.3) + # Dodge bars by both b
  scale_y_continuous(limits = c(-50, 50), # Set y-axis from -50% to +50% (around 50%)
                    breaks = seq(-50, 50, 10), # Customize y-axis breaks
                    labels = c("0", "10", "20", "30", "40", "50", "60", "70", "80", "90", "100"))) + #
  coord_flip() + # Flip coordinates so the bars are horizontal
  theme_minimal() + # Use minimal theme
  labs(x = NULL,
       y = "% of Alates Choosing #220",
       title = "Aphid Preference for #220 Supernatant at 24 Hours") +
  geom_hline(yintercept = 0, color = "white", alpha = 0) + # Add a horizontal line at 50%
  theme(axis.text.x = element_text(angle = 45, hjust = 1), # Rotate x-axis text for better readability
        axis.text.y = element_blank(), # Remove y-axis labels
        legend.position = "bottom", # Place legend at the bottom
        axis.ticks.x = element_blank()) # Remove x-axis ticks for a cleaner look

```

Aphid Preference for #220 Supernatant at 24 Hours



```
#-----

# average across UV/no UV
ggplot(aphid_choice_mean, aes(x = UV, y = mean_percent_diff_from_50_24hrs, fill = UV)) +
  geom_col(position = position_dodge(width = 1), color = "black", size = 0.3) + # Dodge bars by both b
  scale_y_continuous(limits = c(-50, 50), # Set y-axis from -50% to +50% (around 50%)
    breaks = seq(-50, 50, 10), # Customize y-axis breaks
    labels = c("0", "10", "20", "30", "40", "50", "60", "70", "80", "90", "100")) + #
  coord_flip() + # Flip coordinates so the bars are horizontal
  theme_minimal() + # Use minimal theme
  labs(x = NULL,
    y = "% of Alates Choosing #220",
    title = "MEAN Aphid Preference for #220 Supernatant at 24 Hours") +
  geom_hline(yintercept = 0, color = "white", alpha = 0) + # Add a horizontal line at 50%
  theme(axis.text.x = element_text(angle = 45, hjust = 1), # Rotate x-axis text for better readability
    axis.text.y = element_blank(), # Remove y-axis labels
    legend.position = "bottom", # Place legend at the bottom
    axis.ticks.x = element_blank()) # Remove x-axis ticks for a cleaner look
```

MEAN Aphid Preference for #220 Supernatant at 24 Hours

