AGT Reporting

Wiggle Labs

2025-01-27

Agrotech Live | Weekly Summary

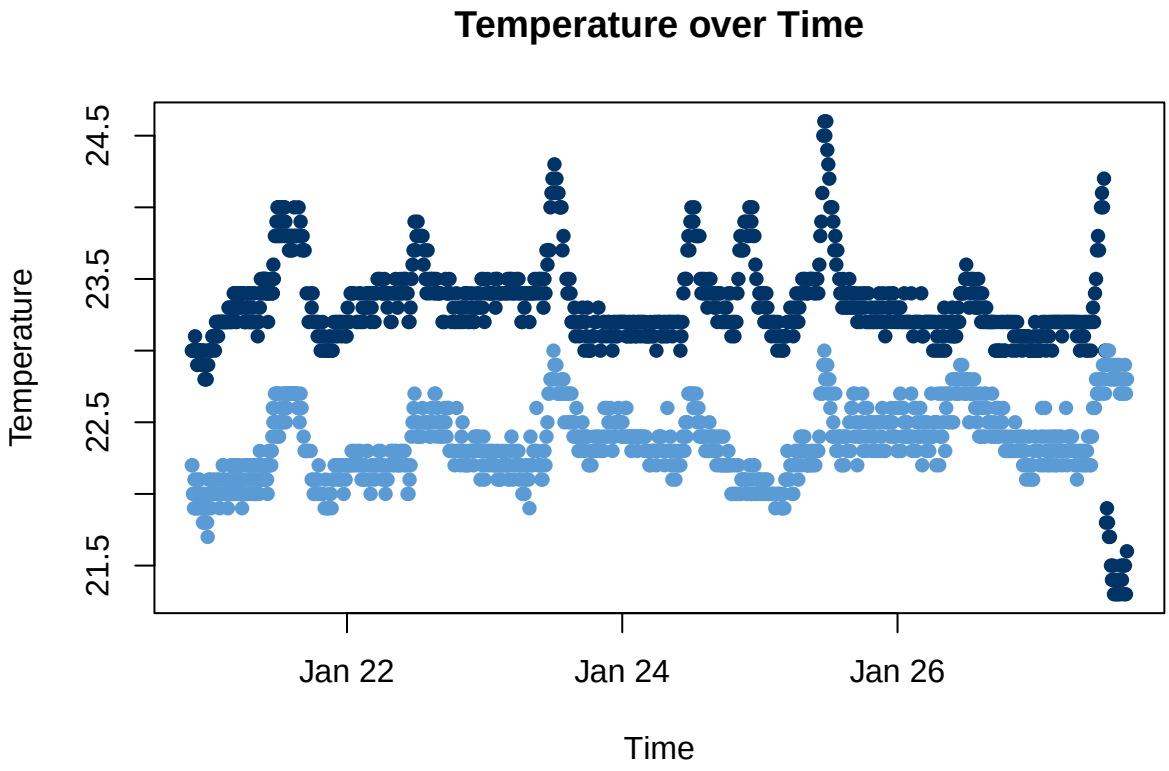
This section examines the relationships between sensor variables (temperature, moisture, light, and conductivity). Pairwise scatter plots illustrate how these variables interact, while color coding emphasizes key patterns and potential correlations.

```
## # A tibble: 2 x 6
## # Groups:   ShortMAC [2]
##   ShortMAC Timestamp           Temperature Moisture Light Conductivity
##   <chr>    <dttm>                    <dbl>    <int> <int>        <int>
## 1 26:c9    2025-01-27 16:00:19        21.6        6   217            0
## 2 4e:df    2025-01-27 16:00:16        22.8       12   335           34
```

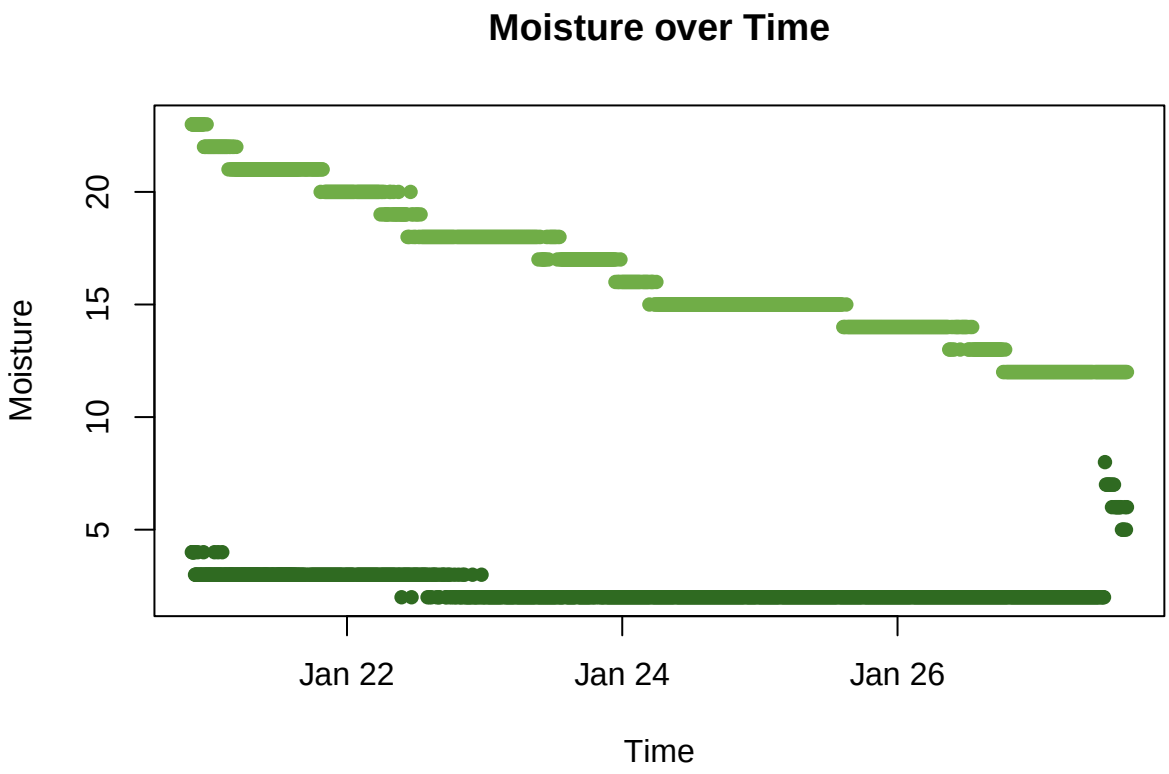
Time Series Analysis

Plot each of the four sensor values over time series data.

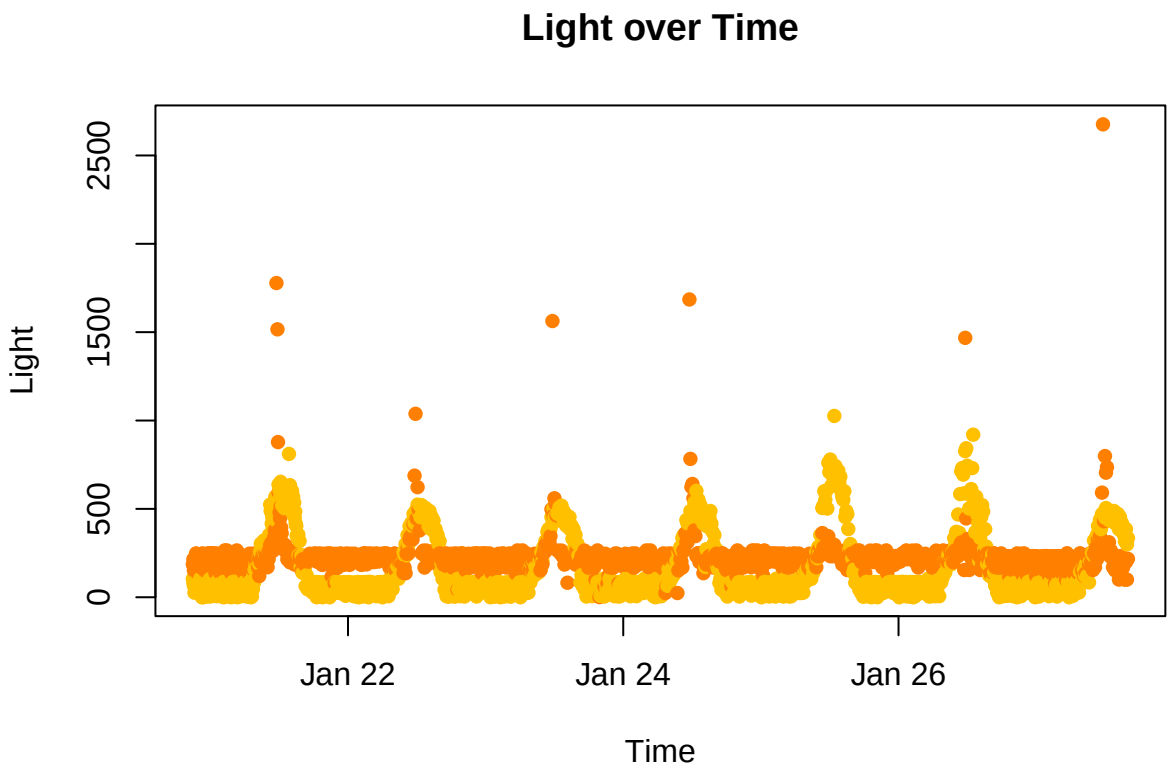
```
# Convert Timestamp to POSIXct format in R
agt_data$Timestamp <- as.POSIXct(agt_data$Timestamp, format = "%Y-%m-%d %H:%M:%S")

# Assign different shades for each MAC address within a color range
temperature_colors <- colorRampPalette(c("#5B9BD5", "#003366"))(length(unique(agt_data$ShortMAC)))  # S
moisture_colors <- colorRampPalette(c("#70AD47", "#2F6A21"))(length(unique(agt_data$ShortMAC)))     # S
light_colors <- colorRampPalette(c("#FFC000", "#FF7F00"))(length(unique(agt_data$ShortMAC)))        # S
conductivity_colors <- colorRampPalette(c("#ED7D31", "#9C4A2F"))(length(unique(agt_data$ShortMAC))) # S

# Create a color map based on ShortMAC for each variable
color_map_temperature <- setNames(temperature_colors, unique(agt_data$ShortMAC))
color_map_moisture <- setNames(moisture_colors, unique(agt_data$ShortMAC))
color_map_light <- setNames(light_colors, unique(agt_data$ShortMAC))
color_map_conductivity <- setNames(conductivity_colors, unique(agt_data$ShortMAC))

# Plot Temperature over Time with different shades for each MAC address
plot(agt_data$Timestamp, agt_data$Temperature,
     col = color_map_temperature[agt_data$ShortMAC],  # Color by MAC address
     xlab = "Time",
     ylab = "Temperature",
     main = "Temperature over Time",
     pch = 16)
```



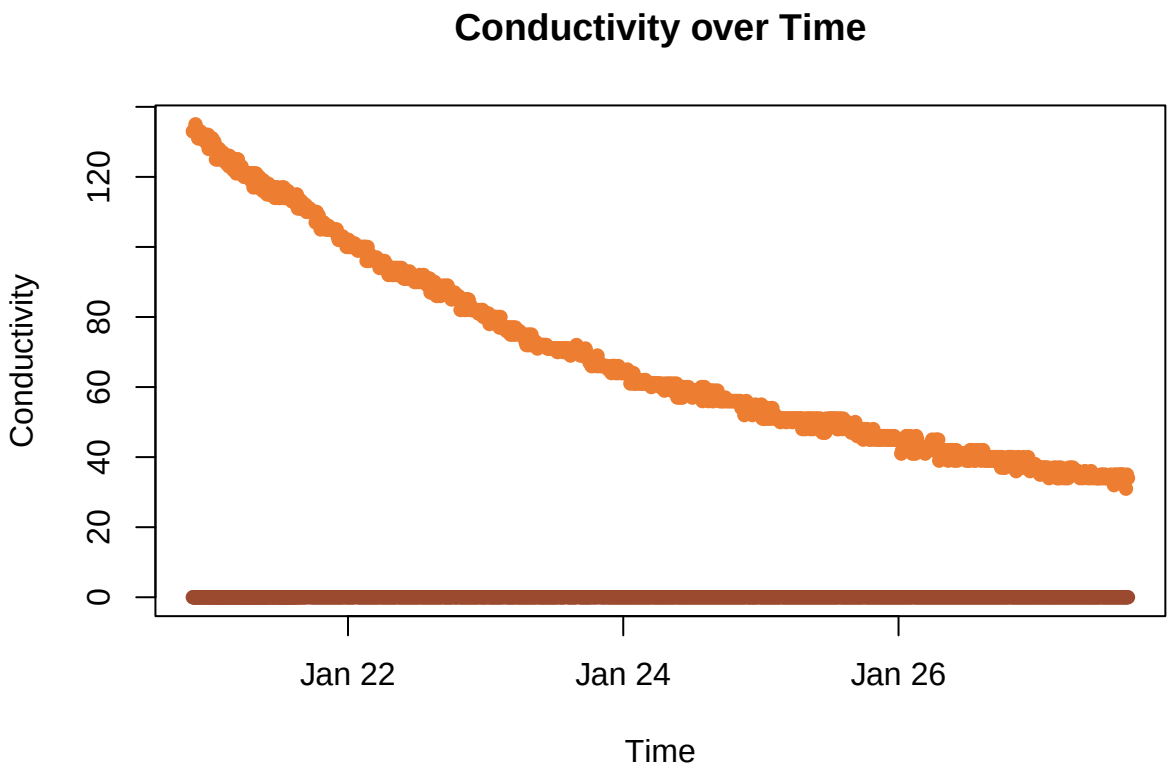

```
# Plot Moisture over Time with different shades for each MAC address
plot(agt_data$Timestamp, agt_data$Moisture,
     col = color_map_moisture[agt_data$ShortMAC],  # Color by MAC address
     xlab = "Time",
     ylab = "Moisture",
     main = "Moisture over Time",
     pch = 16)
```




```
# Plot Light over Time with different shades for each MAC address
plot(agt_data$Timestamp, agt_data$Light,
     col = color_map_light[agt_data$ShortMAC],  # Color by MAC address
     xlab = "Time",
     ylab = "Light",
     main = "Light over Time",
     pch = 16)
```




```
# Plot Conductivity over Time with different shades for each MAC address
plot(agt_data$Timestamp, agt_data$Conductivity,
     col = color_map_conductivity[agt_data$ShortMAC],  # Color by MAC address
     xlab = "Time",
     ylab = "Conductivity",
     main = "Conductivity over Time",
     pch = 16)
```



Matrices
Correlation Matrices

```
  Temperature <- c(agt_data$Temperature)
  Moisture <- c(agt_data$Moisture)
  Light <- c(agt_data$Light)
  Conductivity <- c(agt_data$Conductivity)

  matrix_data <- data.frame(Temperature, Moisture, Light, Conductivity)
  print("Covariance Matrix")
```

```
## [1] "Covariance Matrix"
```

```
  cov_matrix <- cov(matrix_data)
  cov_matrix
```

```
##              Temperature    Moisture       Light Conductivity
## Temperature    0.3332819   -3.709093    36.08063    -19.32098
## Moisture      -3.7090931   57.587539  -231.24384    315.55378
## Light         36.0806254 -231.243837 30201.56603  -1249.34075
## Conductivity -19.3209826  315.553783 -1249.34075   1841.79686
```

```
  print("Correlation Matrix")
```

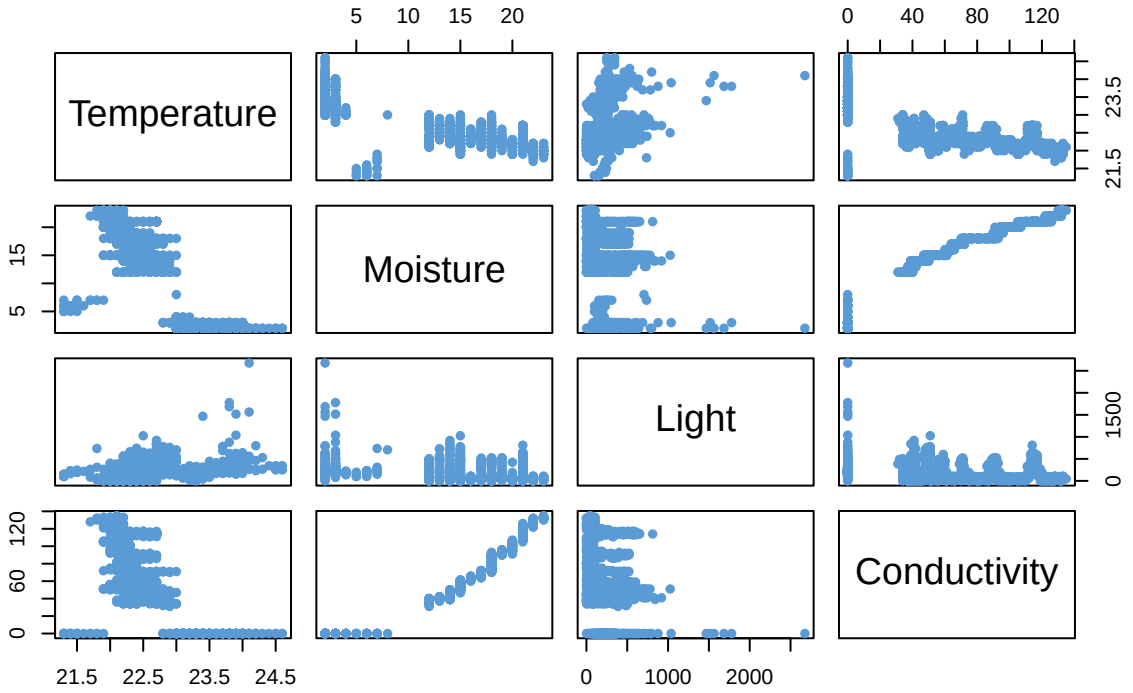
```
## [1] "Correlation Matrix"
```

```r
  cor_matrix <- cor(matrix_data)
  cor_matrix
```

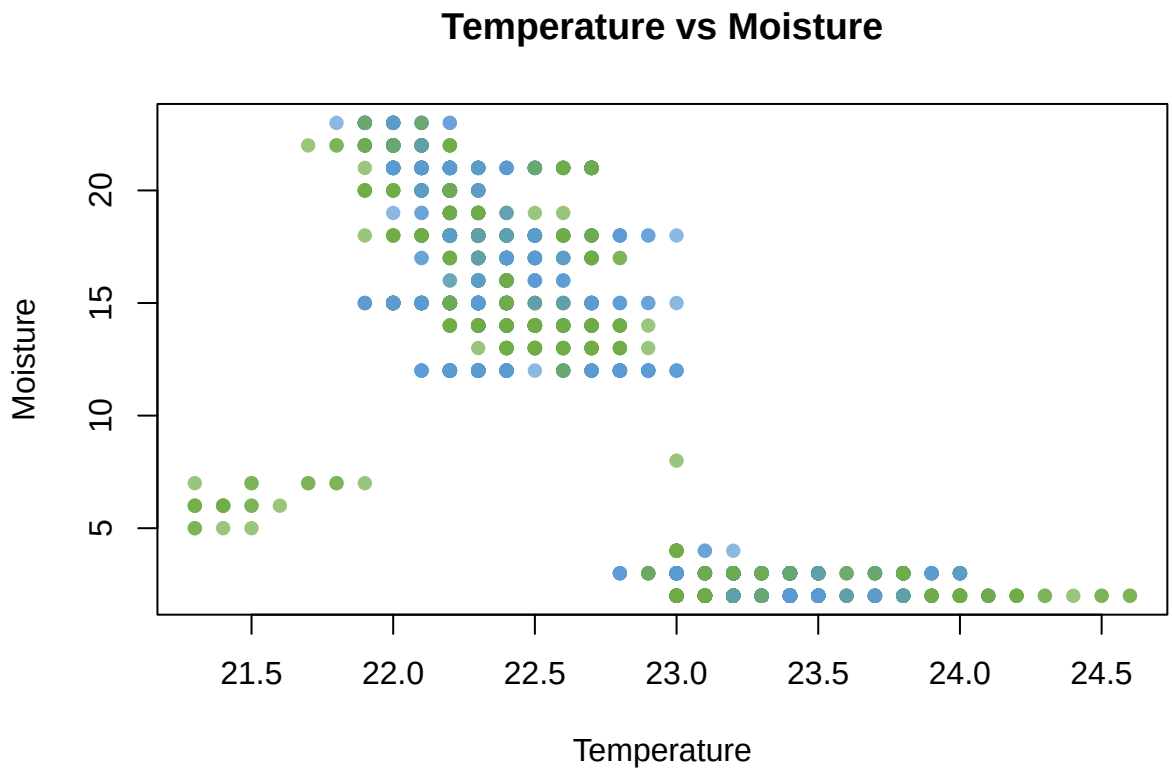
```
##                Temperature   Moisture      Light Conductivity
## Temperature     1.0000000 -0.8466377  0.3596280   -0.7798346
## Moisture       -0.8466377  1.0000000 -0.1753441    0.9689208
## Light           0.3596280 -0.1753441  1.0000000   -0.1675118
## Conductivity   -0.7798346  0.9689208 -0.1675118    1.0000000
```

Plotting variables against each other.

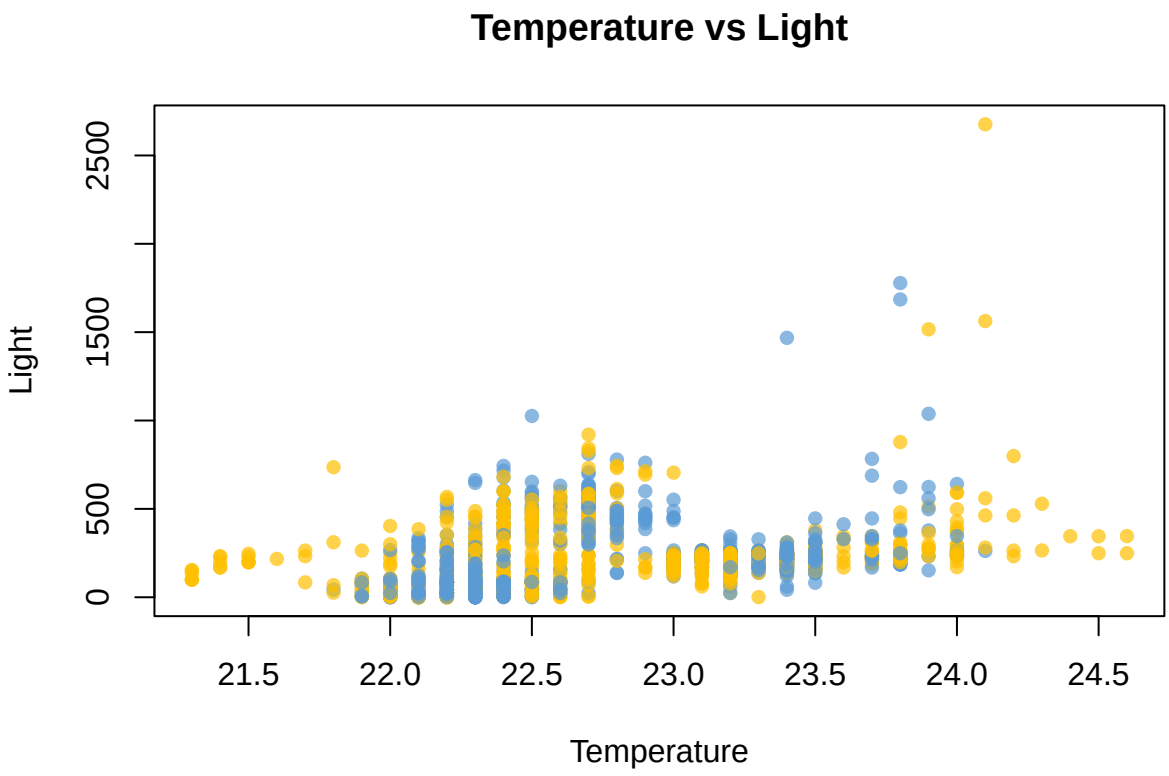
```r
# Define the color palette
colors <- c(
    temperature = "#5B9BD5",  # Soft blue
    moisture = "#70AD47",     # Sage green
    light = "#FFC000",        # Warm yellow
    conductivity = "#ED7D31"  # Muted orange
)

# Assuming agt_data is your data frame
pairs(agt_data[, c("Temperature", "Moisture", "Light", "Conductivity")],
      col = colors["temperature"],
      pch = 16,
      main = "Scatter Plot Matrix")
```



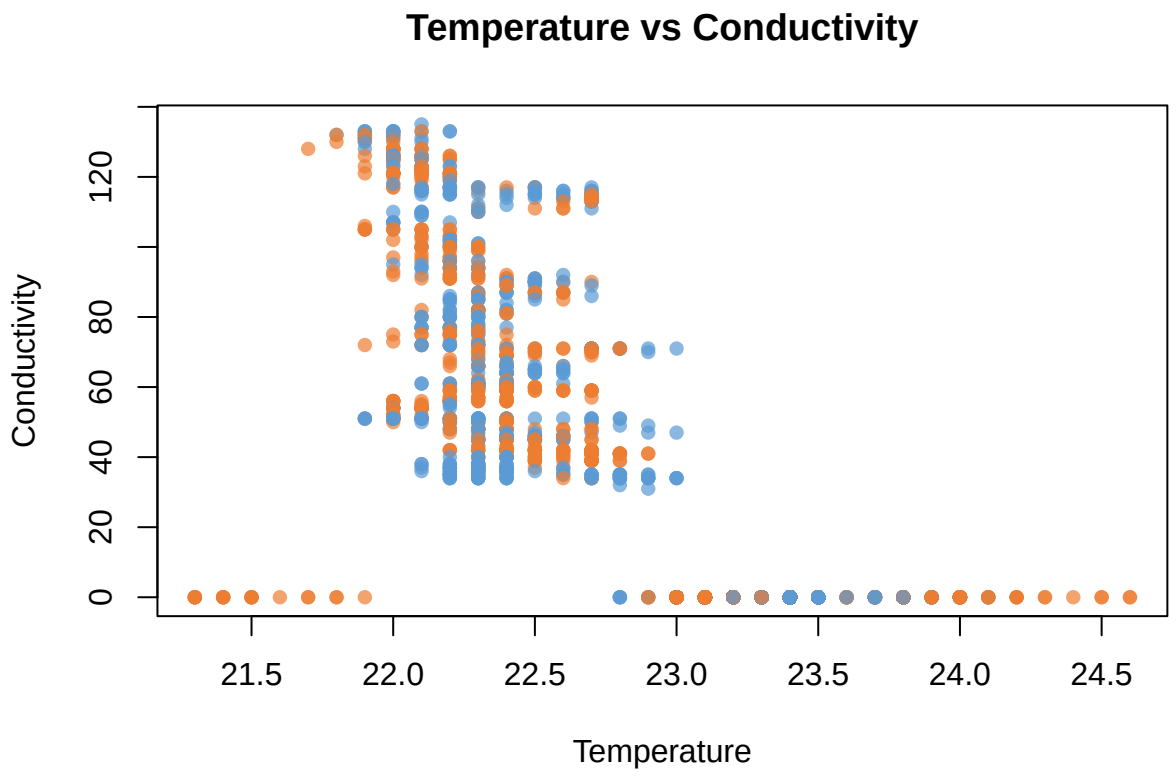
```r
# Plot Temperature vs Moisture
plot(agt_data$Temperature, agt_data$Moisture,
     col = adjustcolor(colors[c("temperature", "moisture")], alpha=0.7),
     xlab = "Temperature",
     ylab = "Moisture",
     main = "Temperature vs Moisture",
     pch = 16)
```



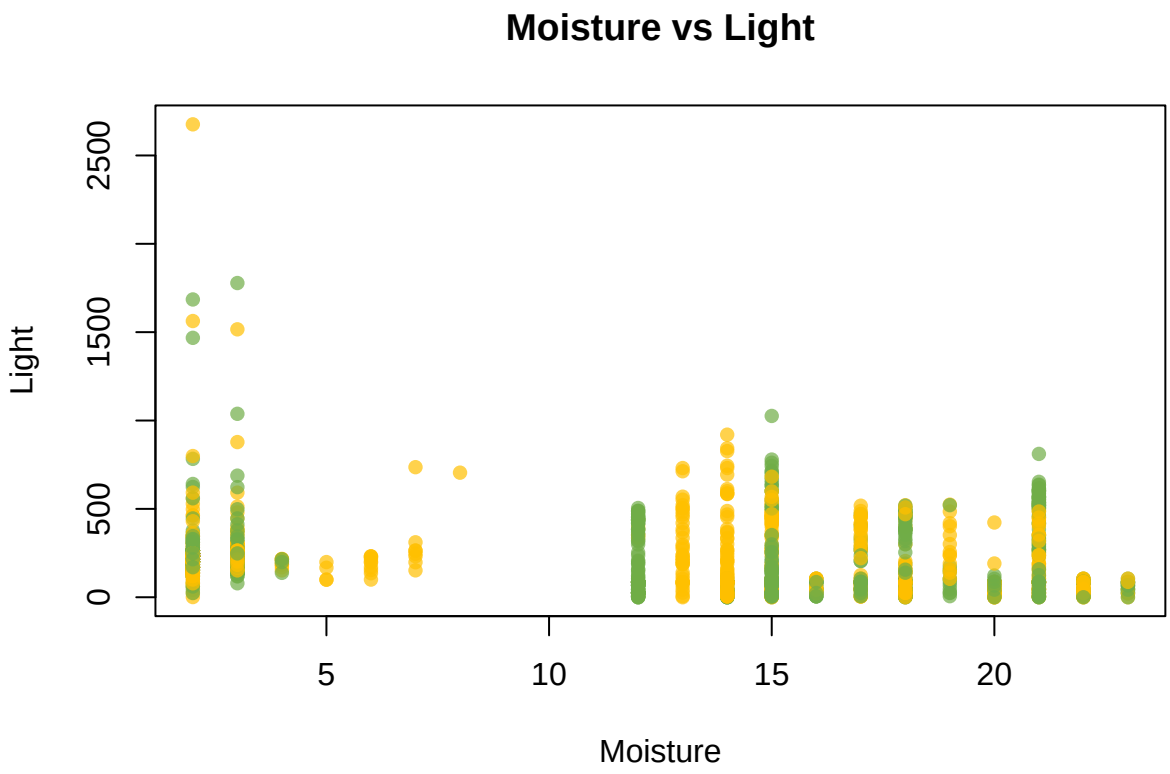

```r
# Plot Temperature vs Light
plot(agt_data$Temperature, agt_data$Light,
     col = adjustcolor(colors[c("temperature", "light")], alpha=0.7),
     xlab = "Temperature",
     ylab = "Light",
     main = "Temperature vs Light",
     pch = 16)
```



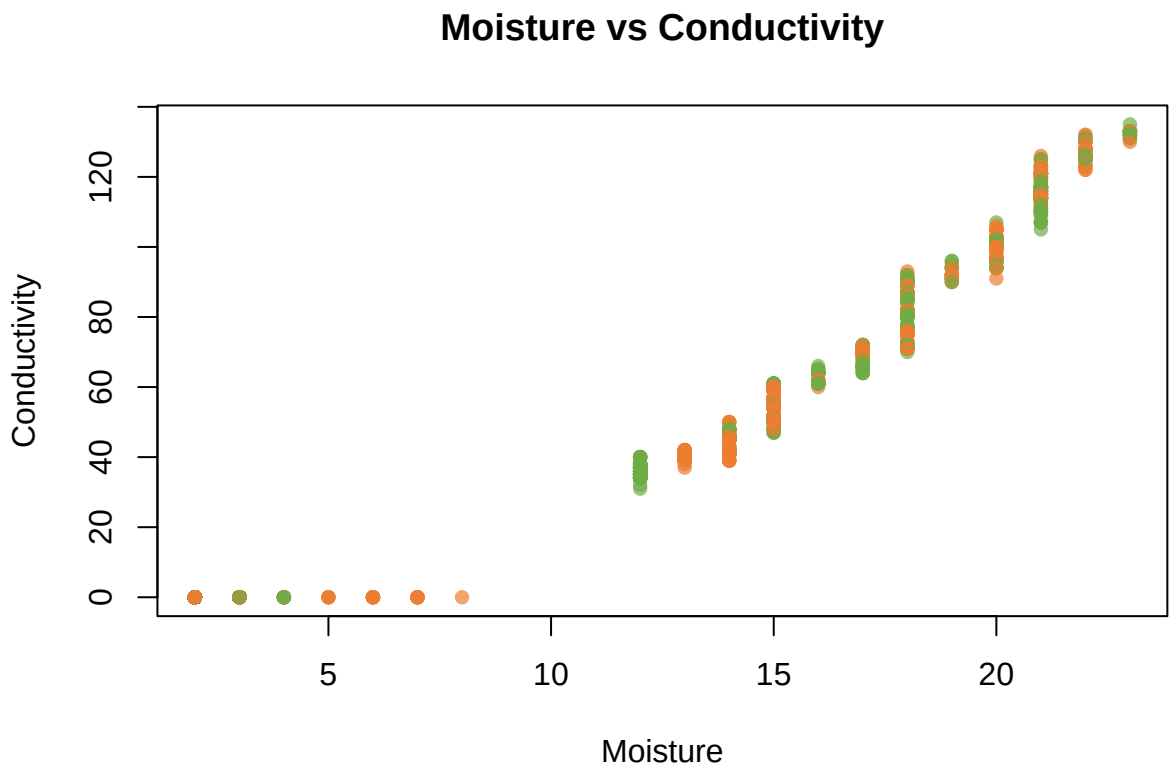

```
# Plot Temperature vs Conductivity
plot(agt_data$Temperature, agt_data$Conductivity,
     col = adjustcolor(colors[c("temperature", "conductivity")], alpha=0.7),
     xlab = "Temperature",
     ylab = "Conductivity",
     main = "Temperature vs Conductivity",
     pch = 16)
```



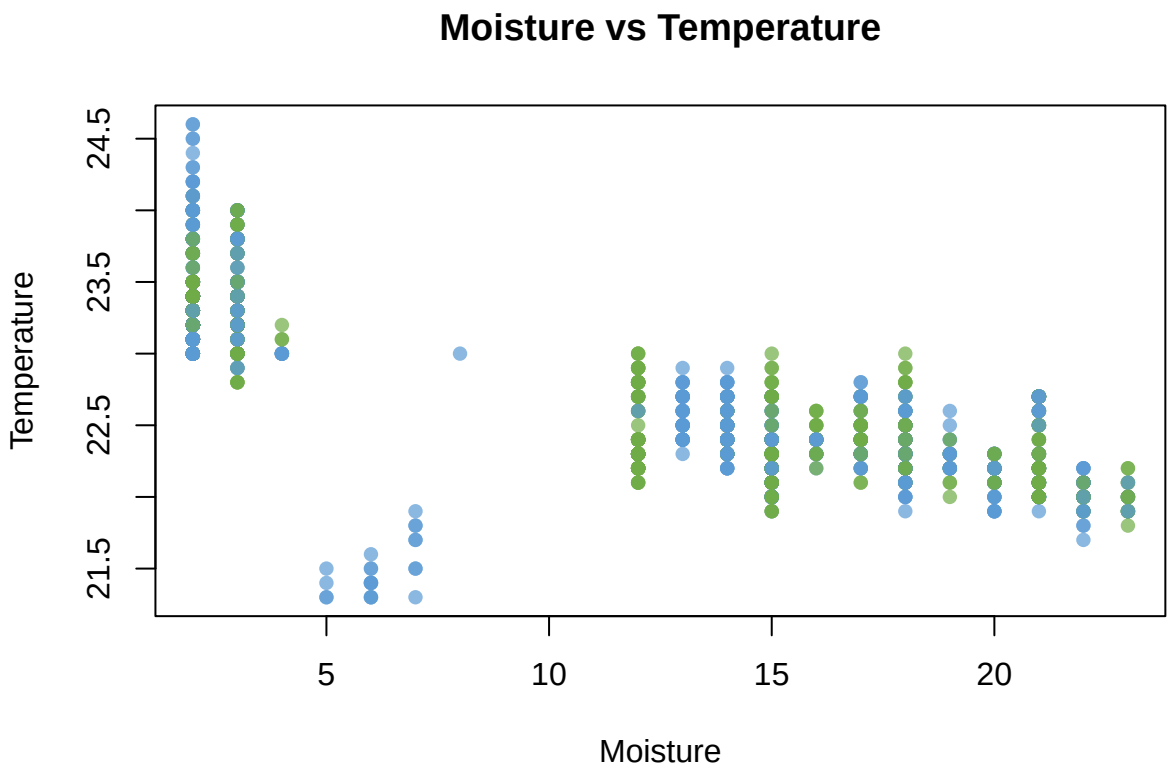

```
# Plot Moisture vs Light
plot(agt_data$Moisture, agt_data$Light,
     col = adjustcolor(colors[c("moisture", "light")], alpha=0.7),
     xlab = "Moisture",
     ylab = "Light",
     main = "Moisture vs Light",
     pch = 16)
```



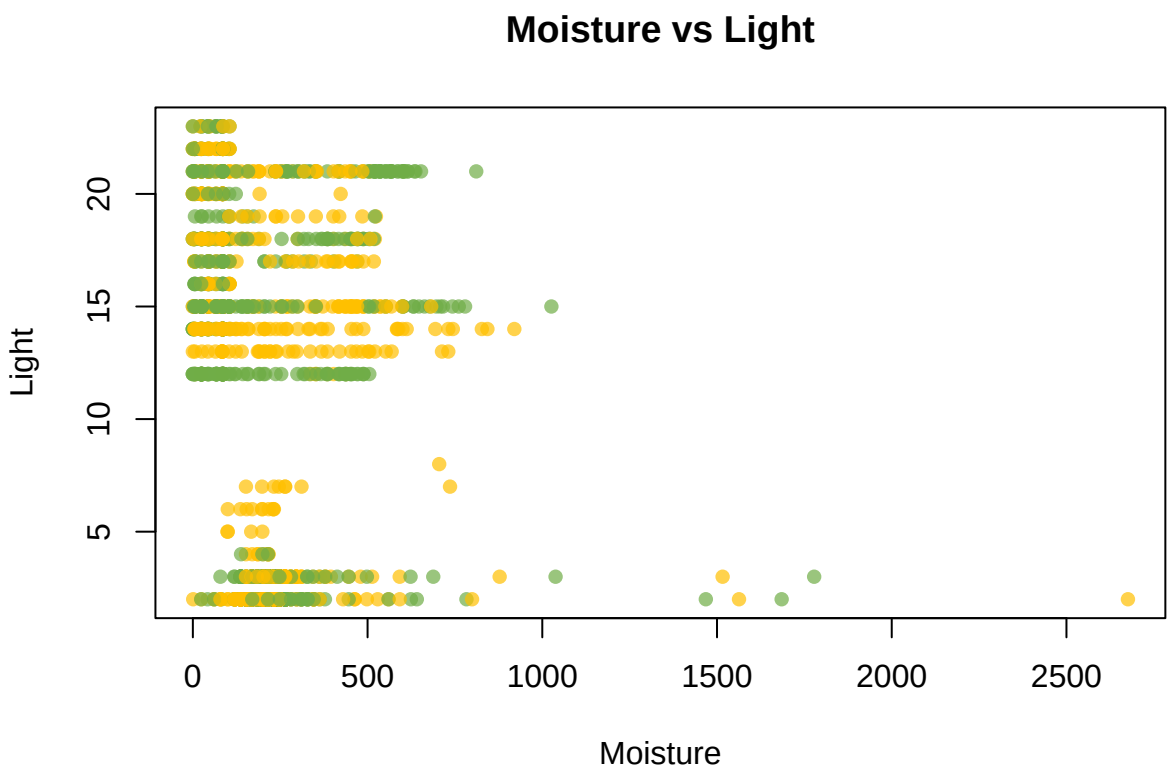

```
# Plot Moisture vs Conductivity
plot(agt_data$Moisture, agt_data$Conductivity,
     col = adjustcolor(colors[c("moisture", "conductivity")], alpha=0.7),
     xlab = "Moisture",
     ylab = "Conductivity",
     main = "Moisture vs Conductivity",
     pch = 16)
```



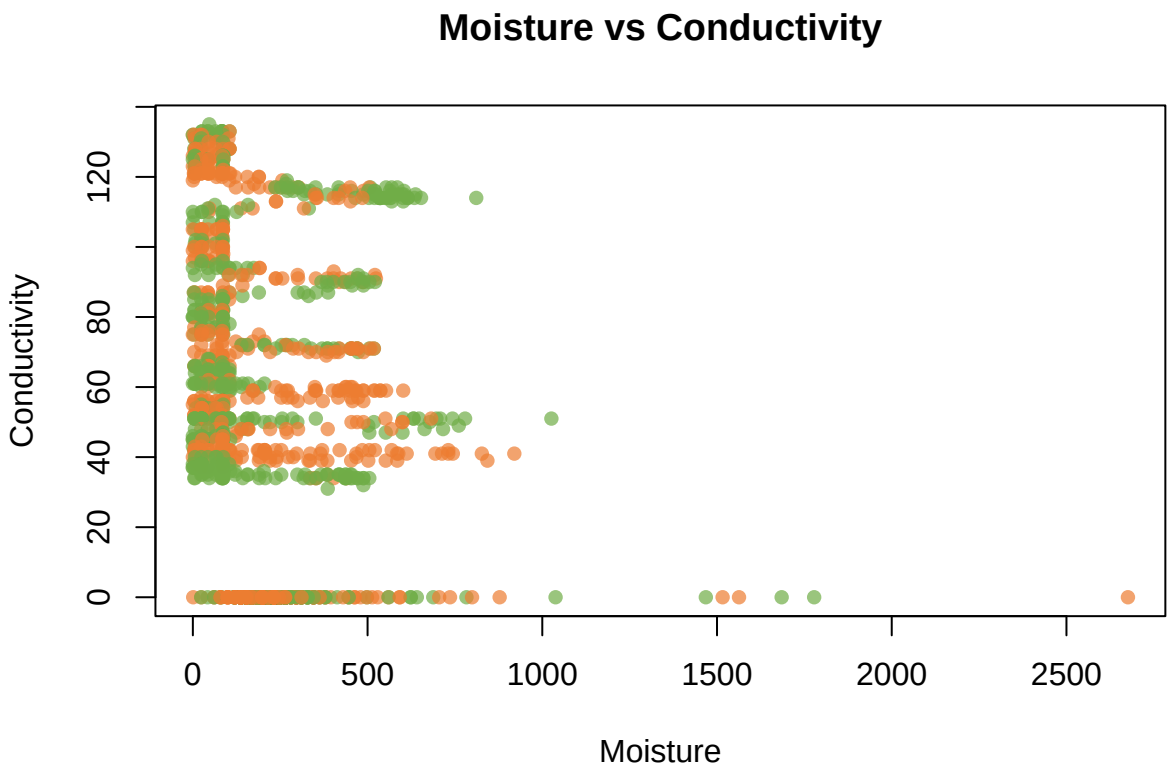

```
# Plot Light vs Conductivity
plot(agt_data$Moisture, agt_data$Temperature,
     col = adjustcolor(colors[c("moisture", "temperature")], alpha=0.7),
     xlab = "Moisture",
     ylab = "Temperature",
     main = "Moisture vs Temperature",
     pch = 16)
```



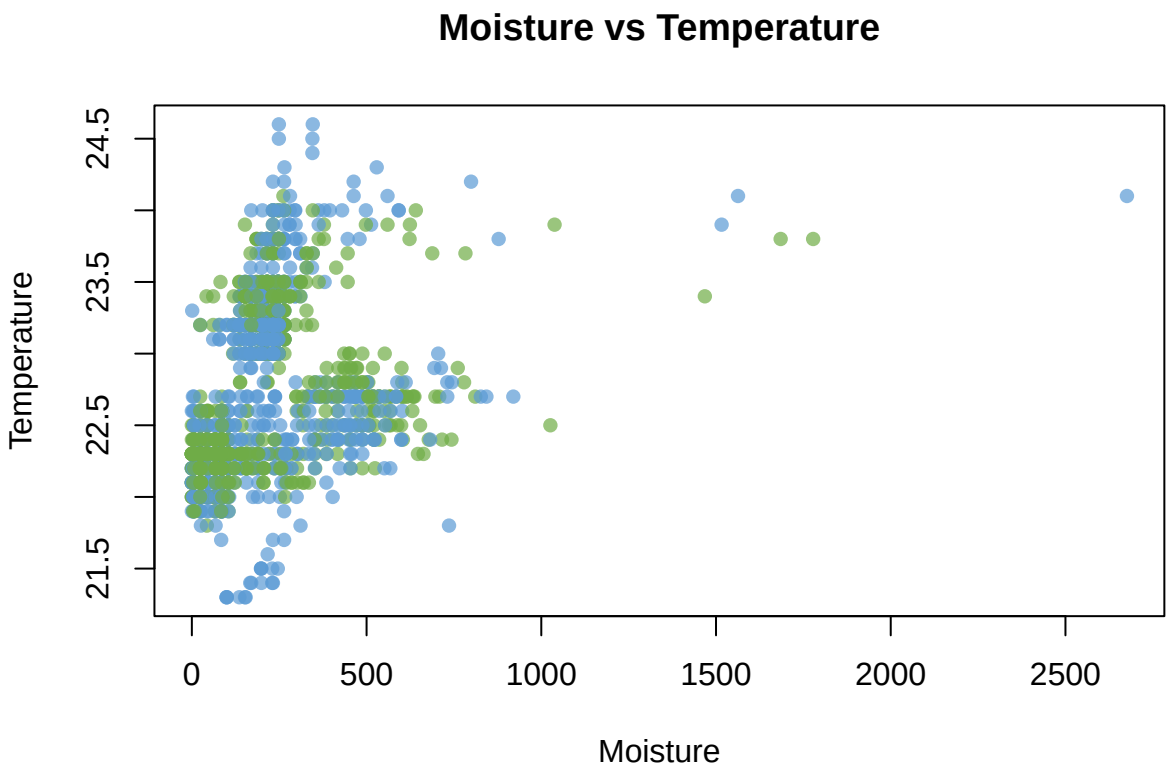

```r
# Plot Moisture vs Light
plot(agt_data$Light, agt_data$Moisture,
     col = adjustcolor(colors[c("moisture", "light")], alpha=0.7),
     xlab = "Moisture",
     ylab = "Light",
     main = "Moisture vs Light",
     pch = 16)
```



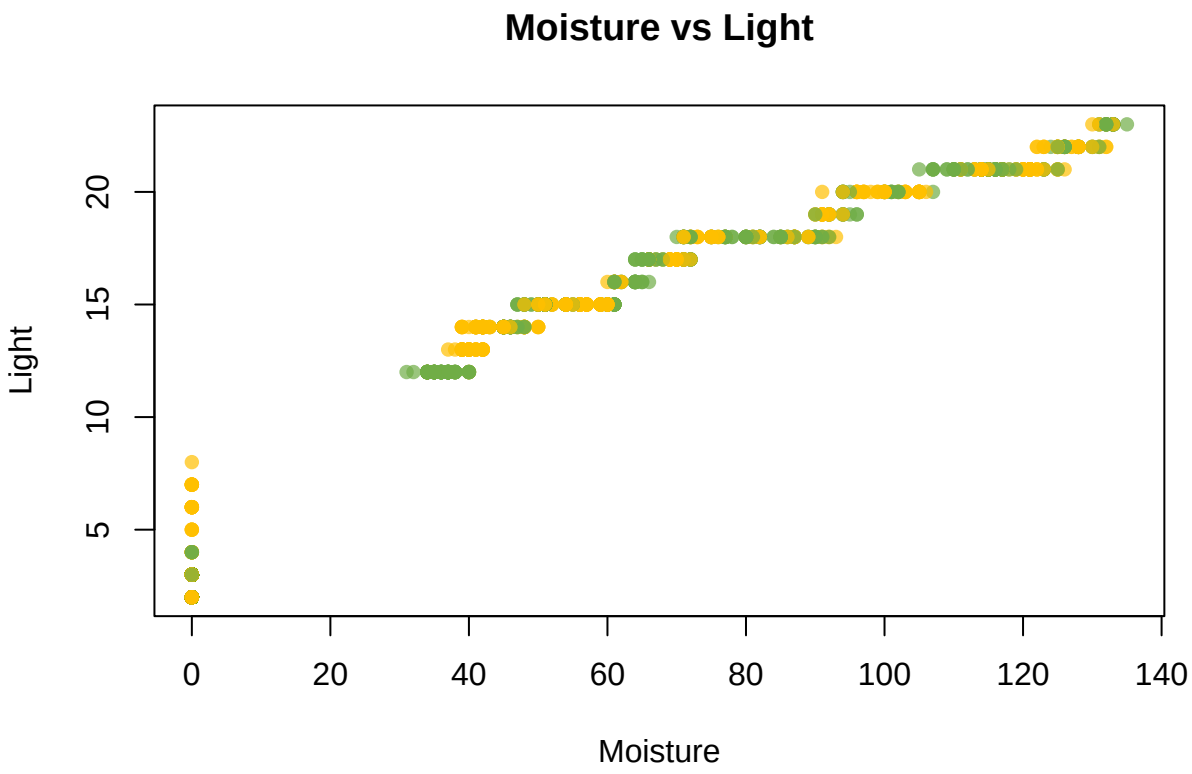

```r
# Plot Moisture vs Conductivity
plot(agt_data$Light, agt_data$Conductivity,
     col = adjustcolor(colors[c("moisture", "conductivity")], alpha=0.7),
     xlab = "Moisture",
     ylab = "Conductivity",
     main = "Moisture vs Conductivity",
     pch = 16)
```



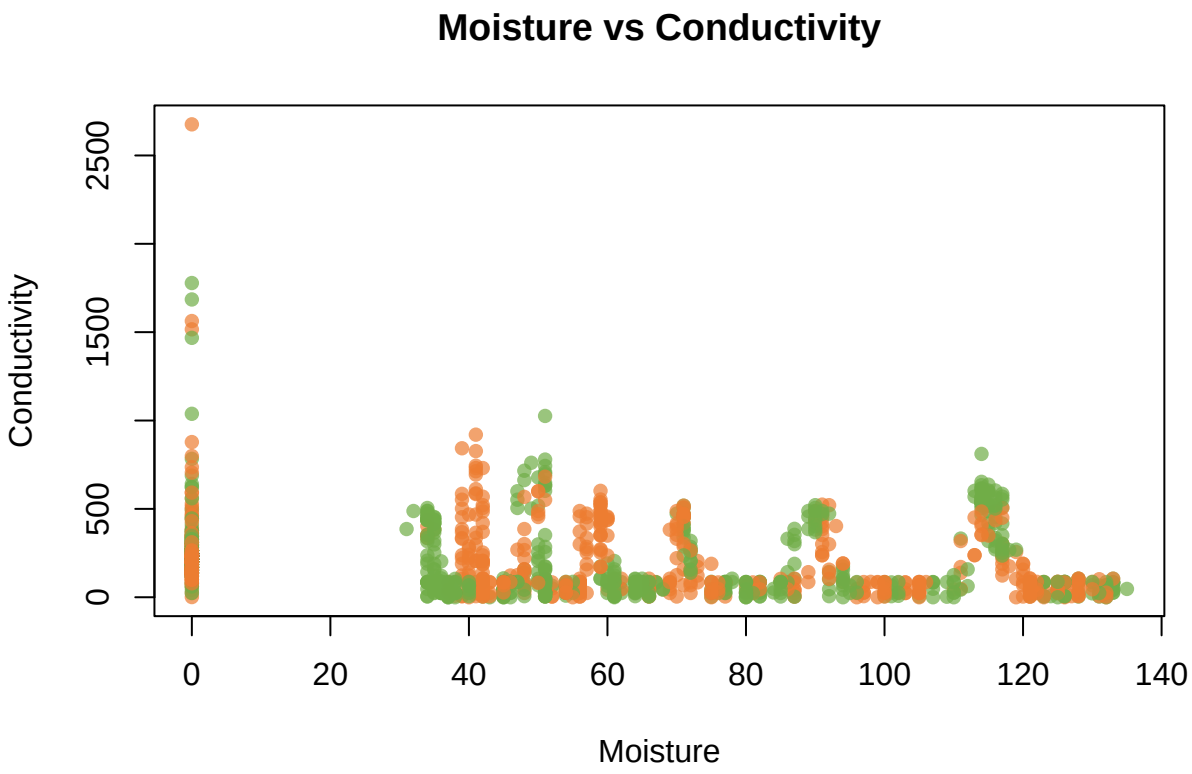

```r
# Plot Light vs Conductivity
plot(agt_data$Light, agt_data$Temperature,
     col = adjustcolor(colors[c("moisture", "temperature")], alpha=0.7),
     xlab = "Moisture",
     ylab = "Temperature",
     main = "Moisture vs Temperature",
     pch = 16)
```



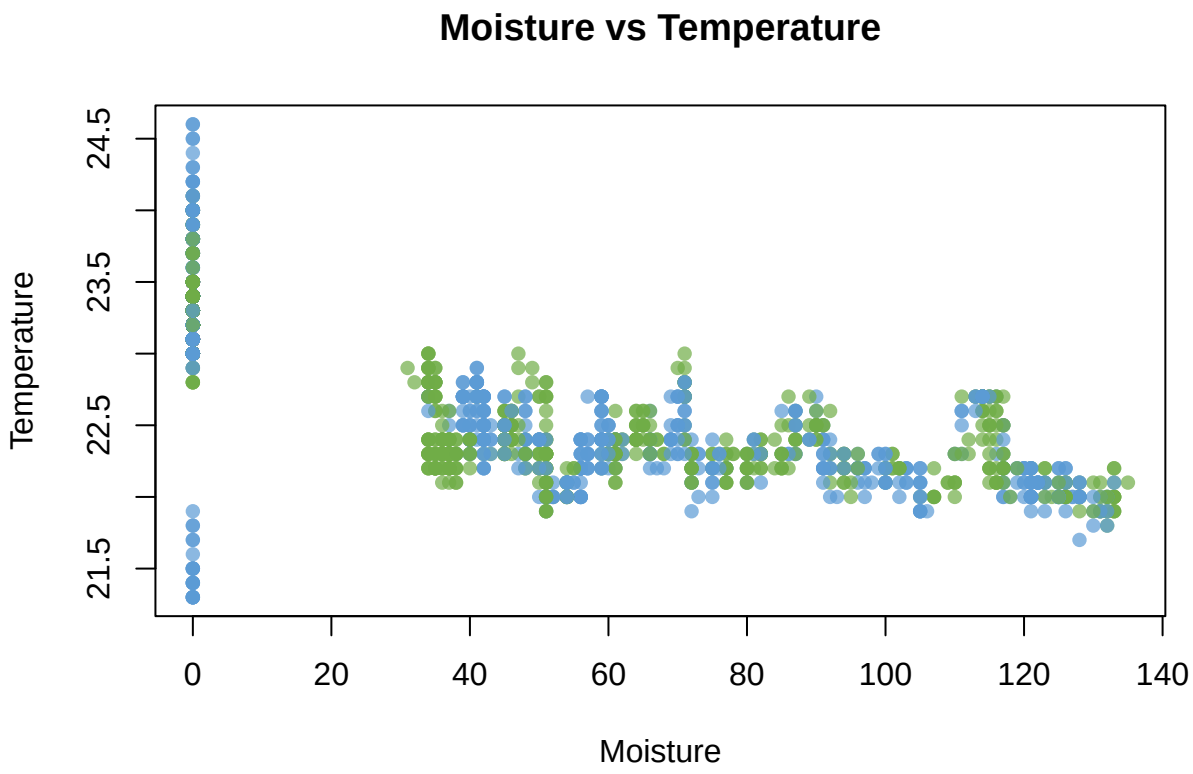

```r
# Plot Moisture vs Light
plot(agt_data$Conductivity, agt_data$Moisture,
     col = adjustcolor(colors[c("moisture", "light")], alpha=0.7),
     xlab = "Moisture",
     ylab = "Light",
     main = "Moisture vs Light",
     pch = 16)
```




```
# Plot Moisture vs Conductivity
plot(agt_data$Conductivity, agt_data$Light,
     col = adjustcolor(colors[c("moisture", "conductivity")], alpha=0.7),
     xlab = "Moisture",
     ylab = "Conductivity",
     main = "Moisture vs Conductivity",
     pch = 16)
```




```
# Plot Light vs Conductivity
plot(agt_data$Conductivity, agt_data$Temperature,
     col = adjustcolor(colors[c("moisture", "temperature")], alpha=0.7),
     xlab = "Moisture",
     ylab = "Temperature",
     main = "Moisture vs Temperature",
     pch = 16)
```



Heatmap

```r
# Load required library
library(ggplot2)

# Select the relevant variables for correlation
matrix_data <- agt_data[, c("Temperature", "Moisture", "Light", "Conductivity")]

# Calculate the correlation matrix
cor_matrix <- cor(matrix_data, use = "complete.obs")

# Convert the correlation matrix into a format suitable for ggplot
cor_data <- as.data.frame(as.table(cor_matrix))
colnames(cor_data) <- c("Variable1", "Variable2", "Correlation")

# Create the heatmap using ggplot2
ggplot(cor_data, aes(x = Variable1, y = Variable2, fill = Correlation)) +
  geom_tile(color = "white") + # Heatmap tiles
  scale_fill_gradient2(low = "blue", high = "red", mid = "white",
                       midpoint = 0, limit = c(-1, 1),
                       name = "Correlation") + # Color scale
  theme_minimal() + # Clean theme
  theme(axis.text.x = element_text(angle = 45, vjust = 1, hjust = 1)) + # Rotate x-axis labels
```

```
labs(title = "Heatmap of Variable Correlations", x = "Variables", y = "Variables")
```