

Untitled

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2024-10-21

```
strawberry_chemical=read.csv('strawberry_chemical.csv')
data=strawberry_chemical
library(dplyr)

##
## 载入程序包: 'dplyr'

## The following objects are masked from 'package:stats':
##
##      filter, lag

## The following objects are masked from 'package:base':
##
##      intersect, setdiff, setequal, union

data <- data %>%
  mutate(MEASURED = ifelse(grepl("MEASURED IN", information),
                           sub(".*MEASURED IN\\s+(.+)", "\\1", information),
                           NA)) %>%
  filter(Name != "TOTAL") %>%
  filter(!Value %in% c("(NA)", "(D)", "(z)"))

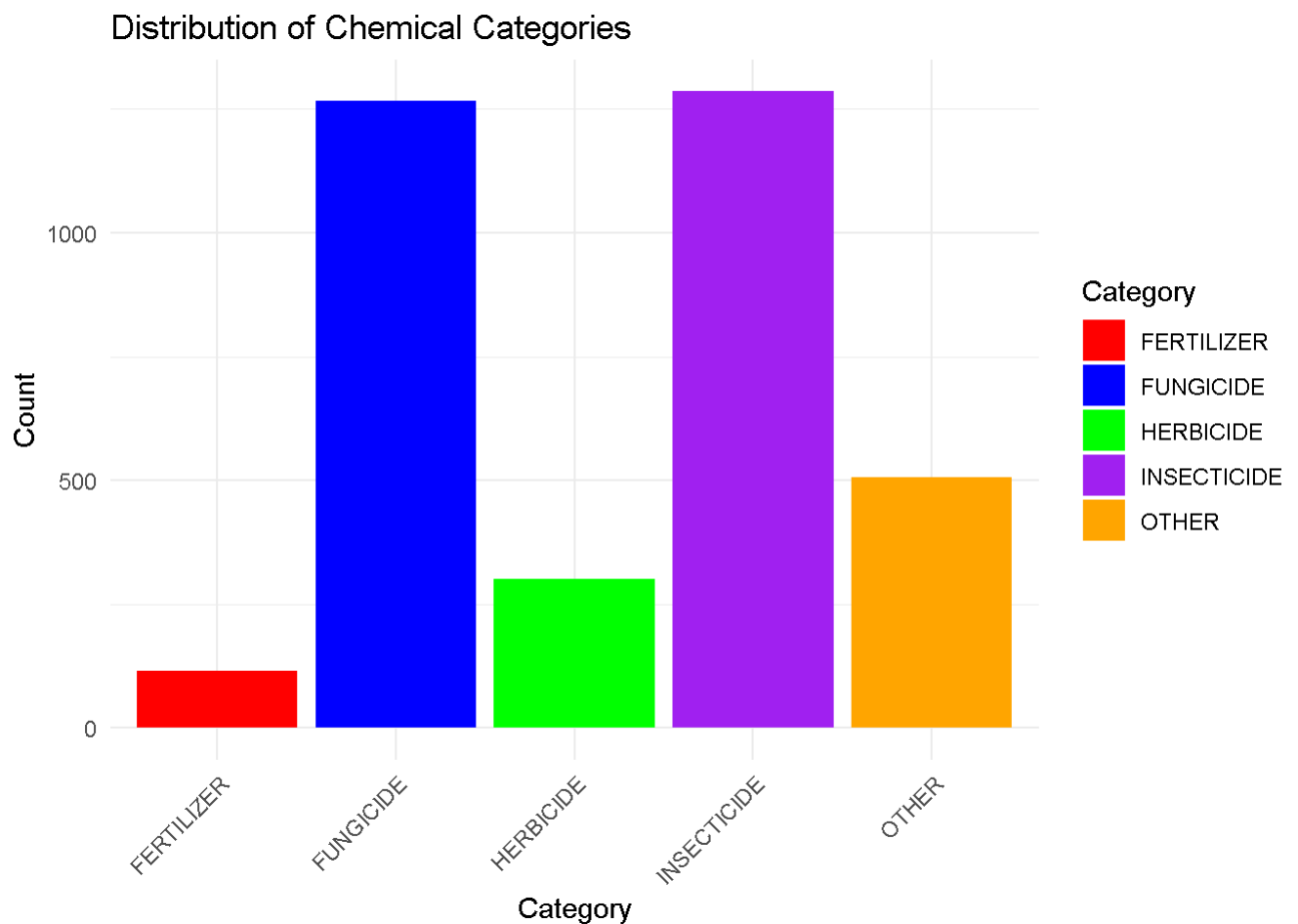
unique(strawberry_chemical$State)

## [1] "CALIFORNIA" "FLORIDA"

library(ggplot2)

custom_colors <- c("red", "blue", "green", "purple", "orange", "yellow", "pink")

ggplot(strawberry_chemical, aes(x = Category, fill = Category)) +
  geom_bar() +
  theme_minimal() +
  theme(
    panel.background = element_rect(fill = "transparent", color = NA),
    plot.background = element_rect(fill = "transparent", color = NA),
    axis.text.x = element_text(angle = 45, hjust = 1)
  ) +
  labs(title = "Distribution of Chemical Categories", x = "Category", y = "Count") +
  scale_fill_manual(values = custom_colors)
```



```
unique(data$MEASURED)
```

```
## [1] "LB"                                "LB / ACRE / APPLICATION, AVG"
## [3] "LB / ACRE / YEAR, AVG"          "NUMBER, AVG"
## [5] "PCT OF AREA BEARING, AVG"
```

```
data_1 <- data %>%
  filter(MEASURED == 'LB')
data_2 <- data %>%
  filter(MEASURED == "LB / ACRE / APPLICATION, AVG")
data_3 <- data %>%
  filter(MEASURED == "LB / ACRE / YEAR, AVG")
data_4 <- data %>%
  filter(MEASURED == "NUMBER, AVG")
data_5 <- data %>%
  filter(MEASURED == "PCT OF AREA BEARING, AVG")
```

```
library(ggplot2)
library(dplyr)
library(scales)
```

```
plot_total_value_by_state <- function(data, state_name, title_suffix) {

  data_clean <- data %>%
```

```

mutate(Value = as.numeric(gsub(",", "", Value))) %>%
filter(!is.na(Value)) %>%
filter(State == state_name)



ggplot(data_clean, aes(x = Category, y = Value)) +
  geom_bar(stat = "identity", fill = "skyblue") +
  theme_minimal() +
  labs(title = paste("Total Value by Category -", title_suffix),
       x = "Category",
       y = "Total Value") +
  scale_y_continuous(labels = comma) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
}

data_list <- list(data_1 = data_1, data_2 = data_2, data_3 = data_3, data_4 =
data_4, data_5 = data_5)

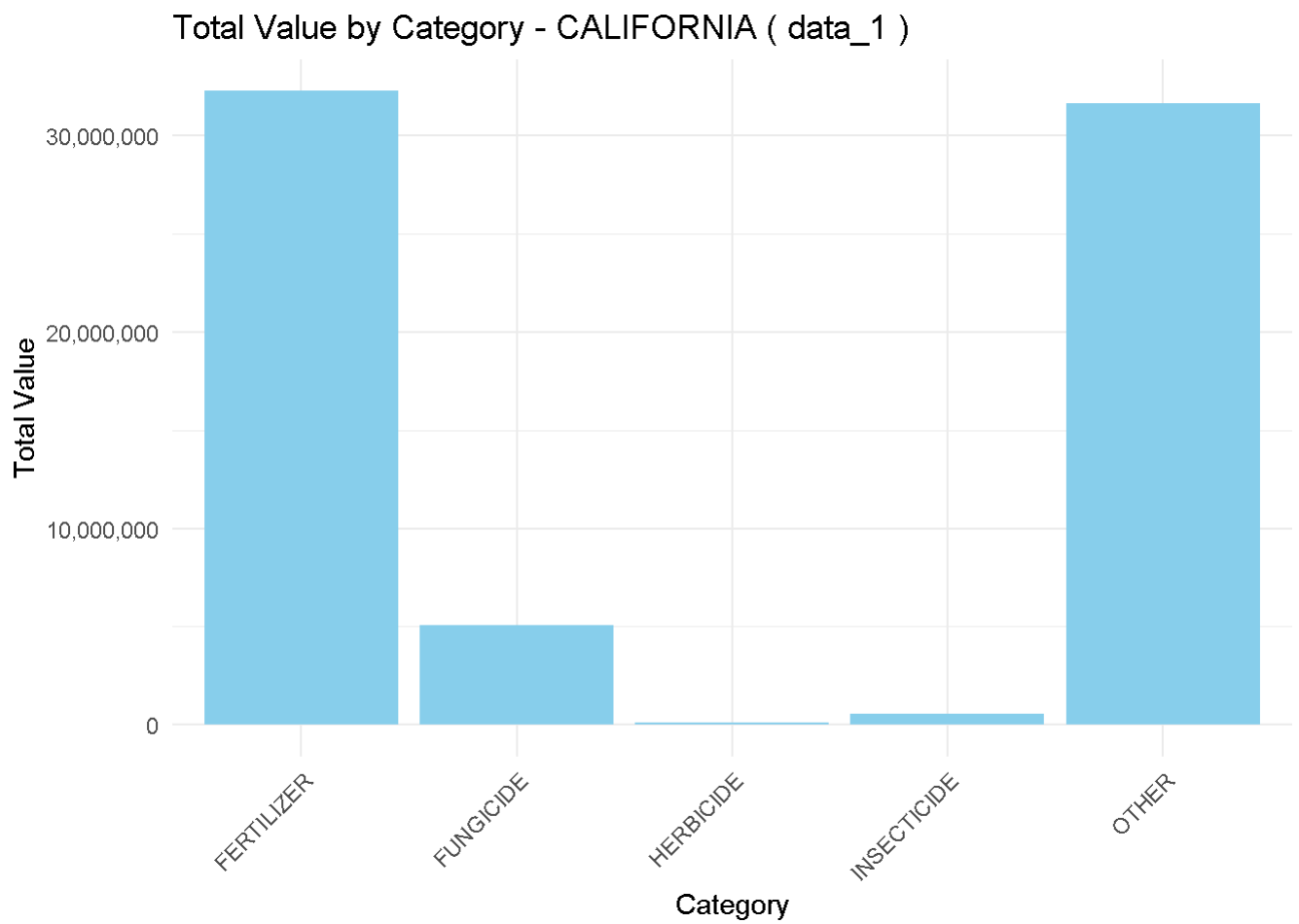
states <- c('CALIFORNIA', 'FLORIDA')

for (i in 1:length(data_list)) {
  data_name <- names(data_list)[i]
  data <- data_list[[i]]

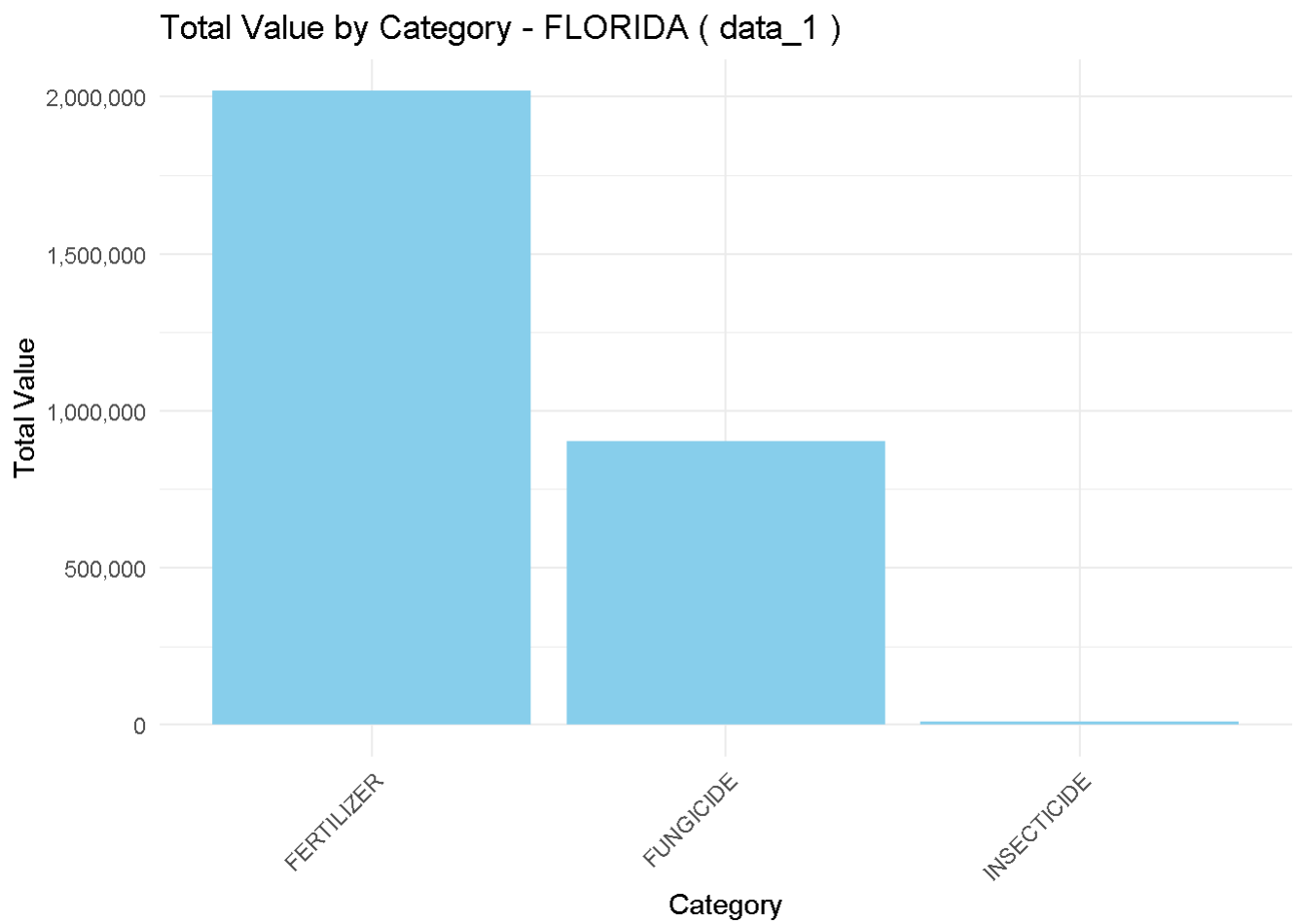
  for (state in states) {
    plot_title <- paste(state, "(", data_name, ")")
    print(plot_total_value_by_state(data, state, plot_title))
  }
}

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了NA
## There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了NA

```

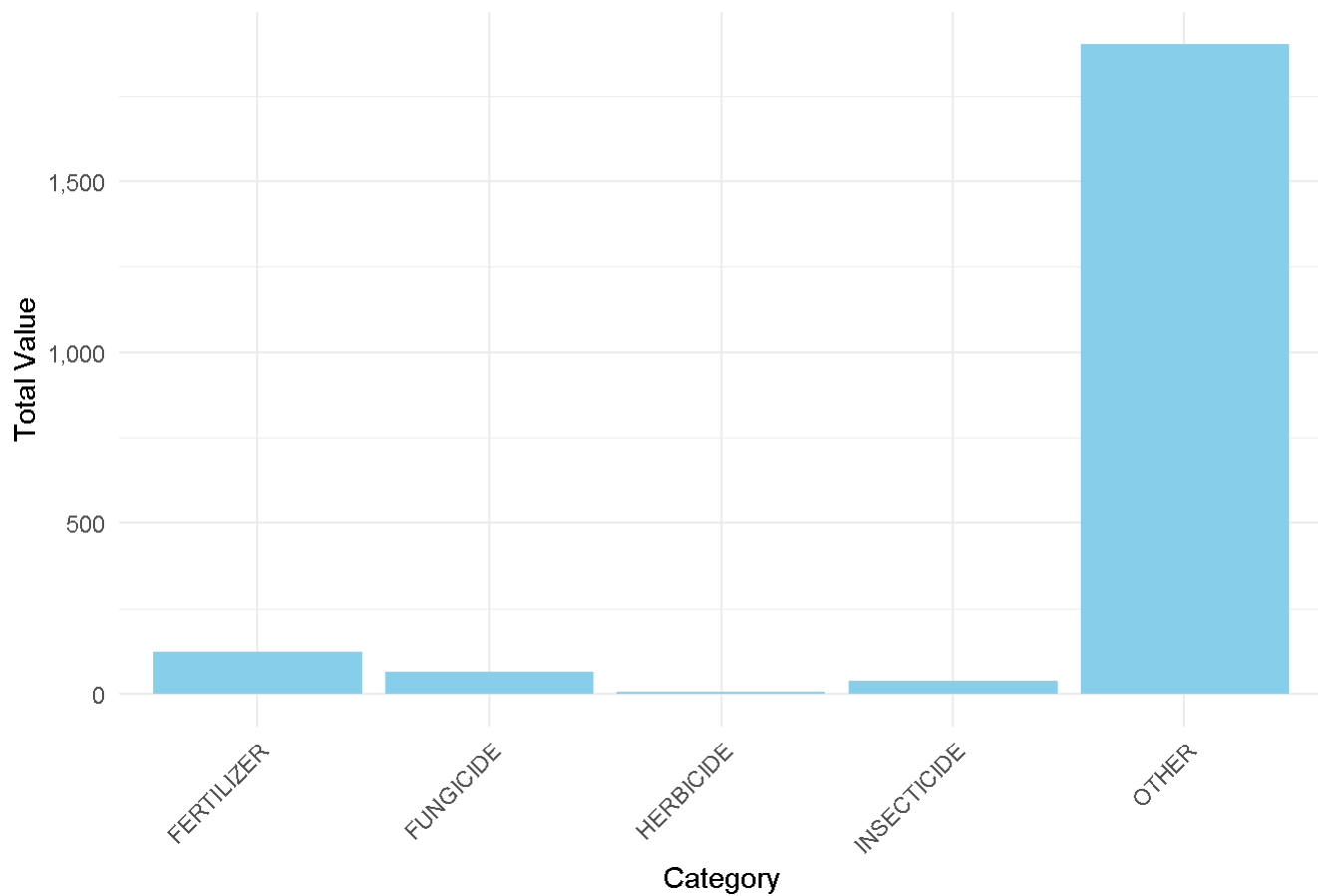


```
## Warning: There was 1 warning in `mutate()`.  
## i In argument: `Value = as.numeric(gsub(",", "", Value))`.  
## Caused by warning:  
## ! 强制改变过程中产生了 NA
```

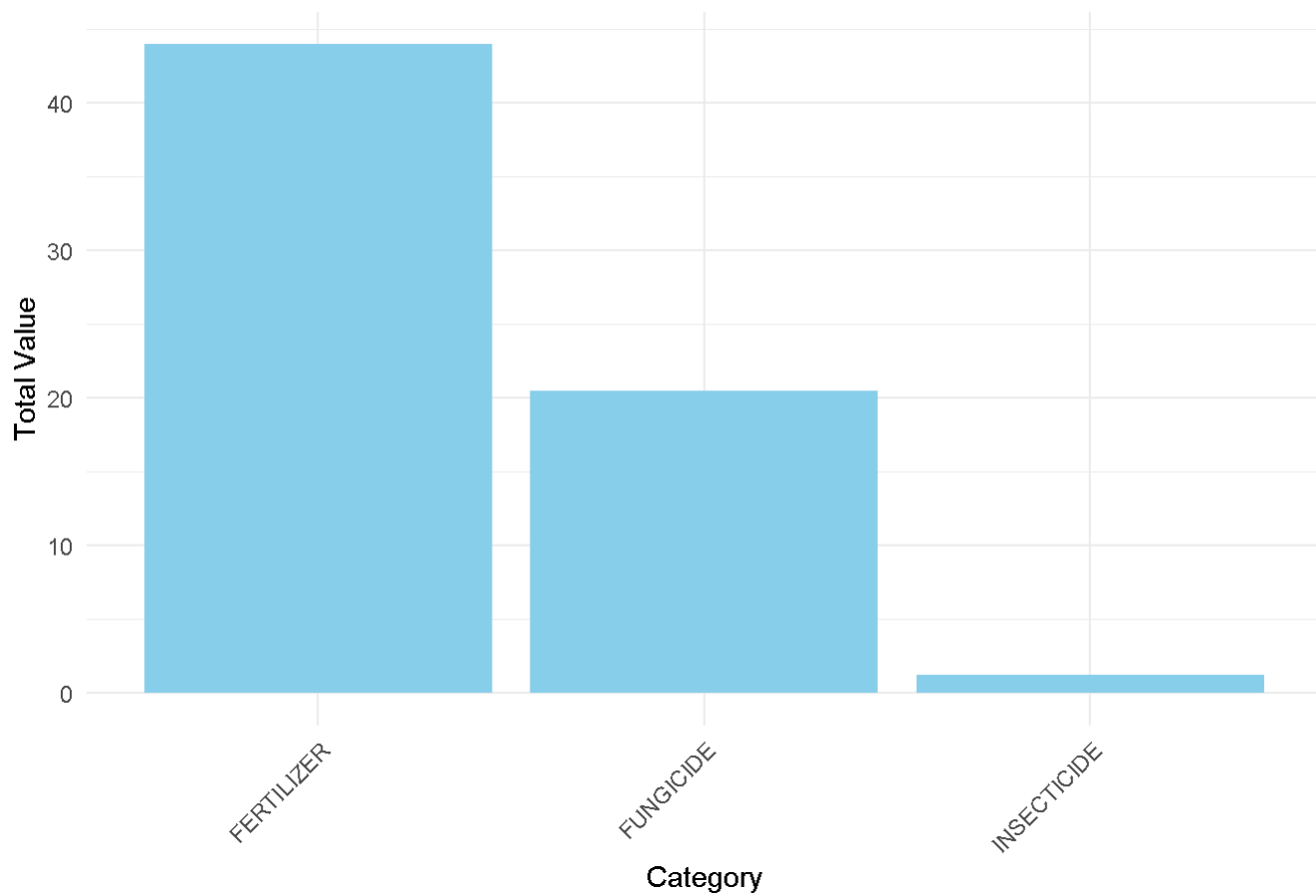


```
## Warning: There was 1 warning in `mutate()`.  
## i In argument: `Value = as.numeric(gsub(",", "", Value))`.  
## Caused by warning:  
## ! 强制改变过程中产生了 NA
```

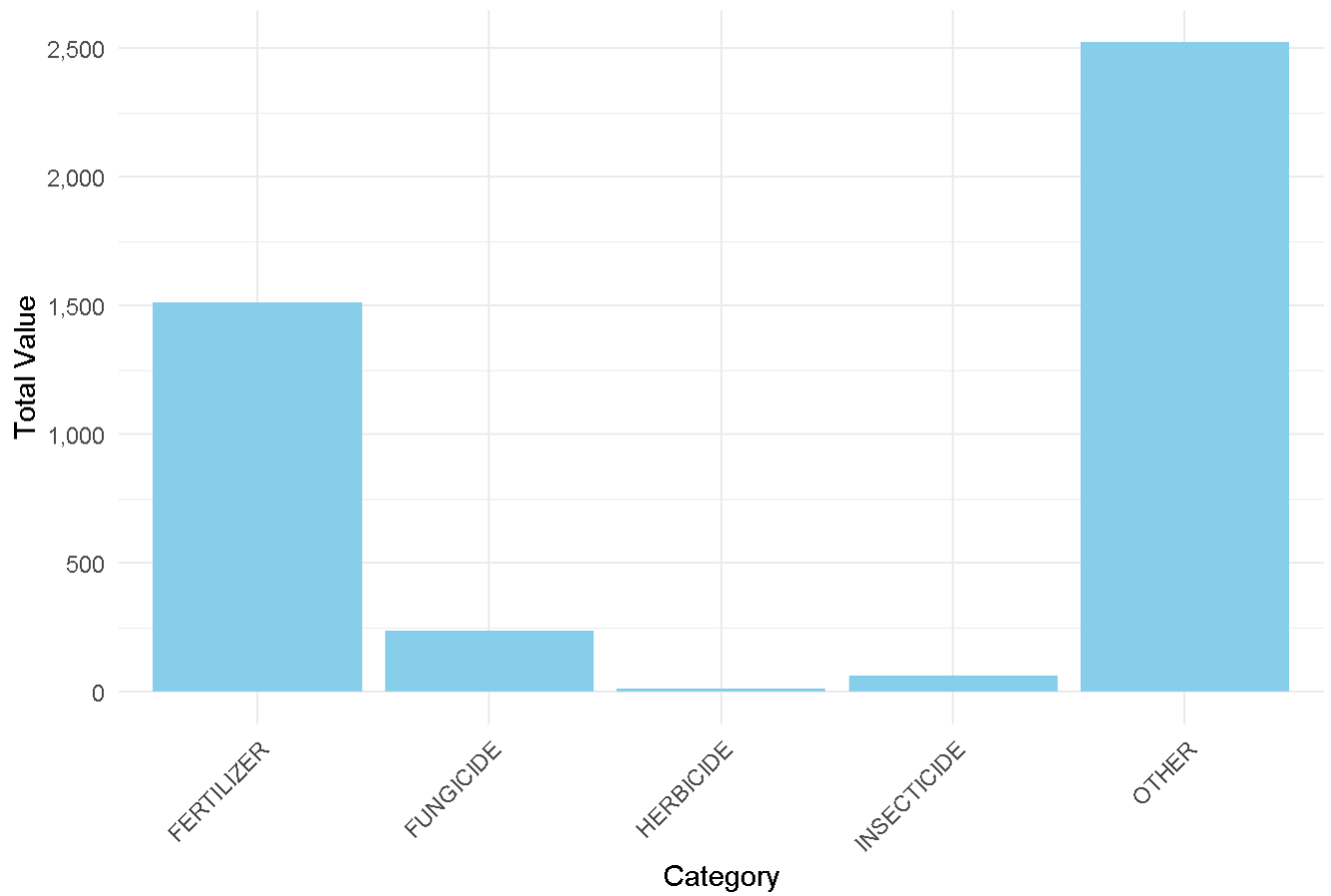
Total Value by Category - CALIFORNIA (data_2)



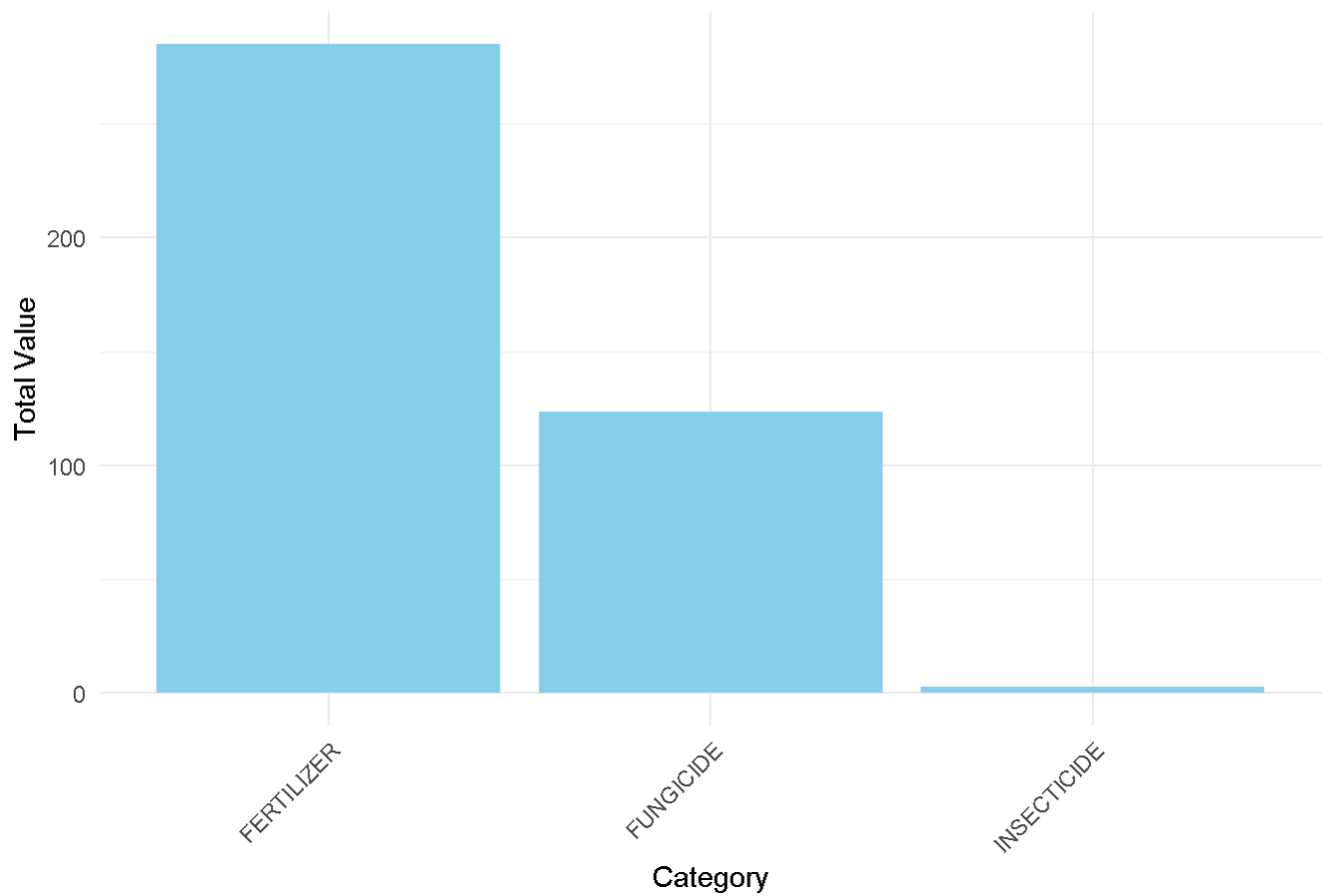
Total Value by Category - FLORIDA (data_2)



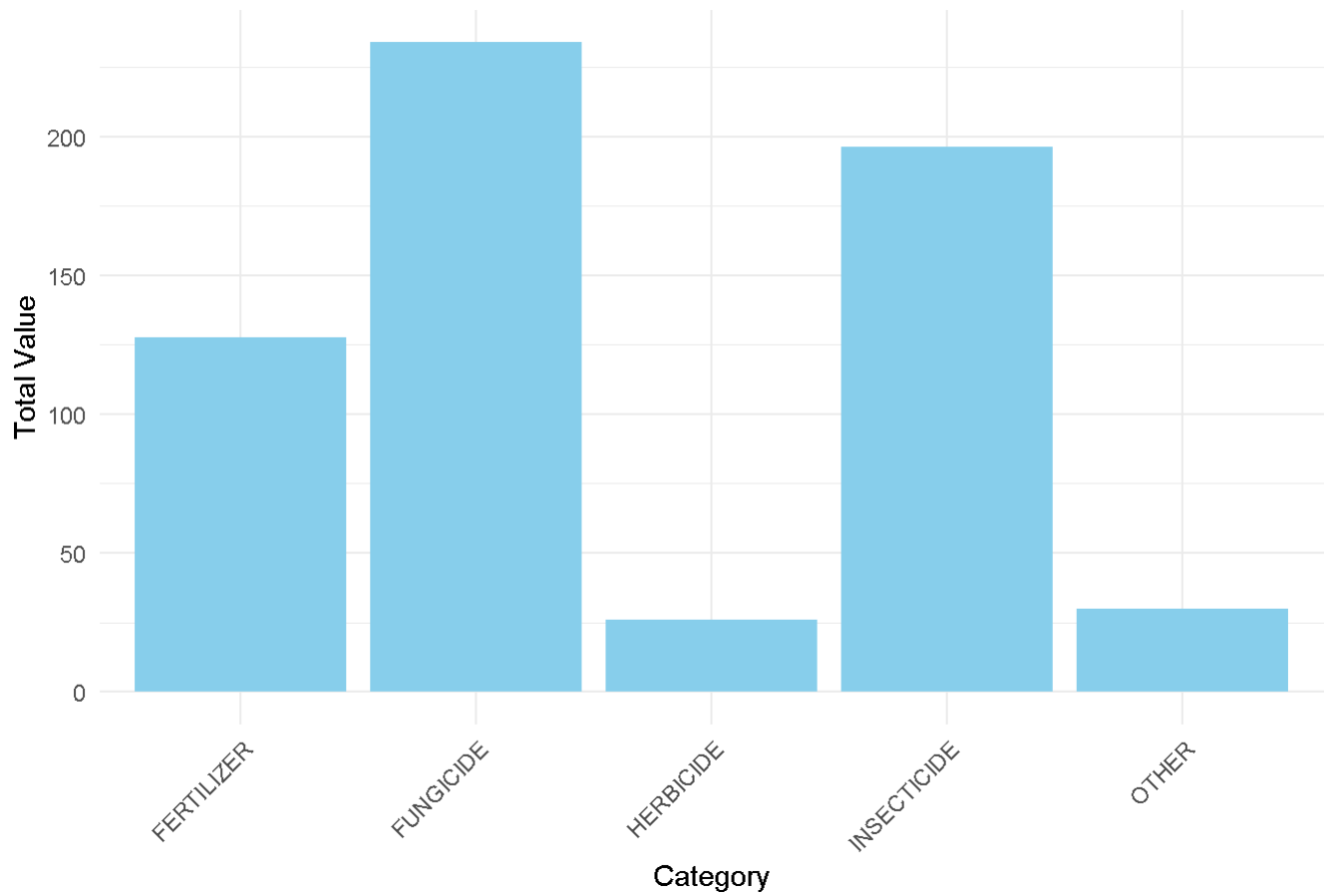
Total Value by Category - CALIFORNIA (data_3)



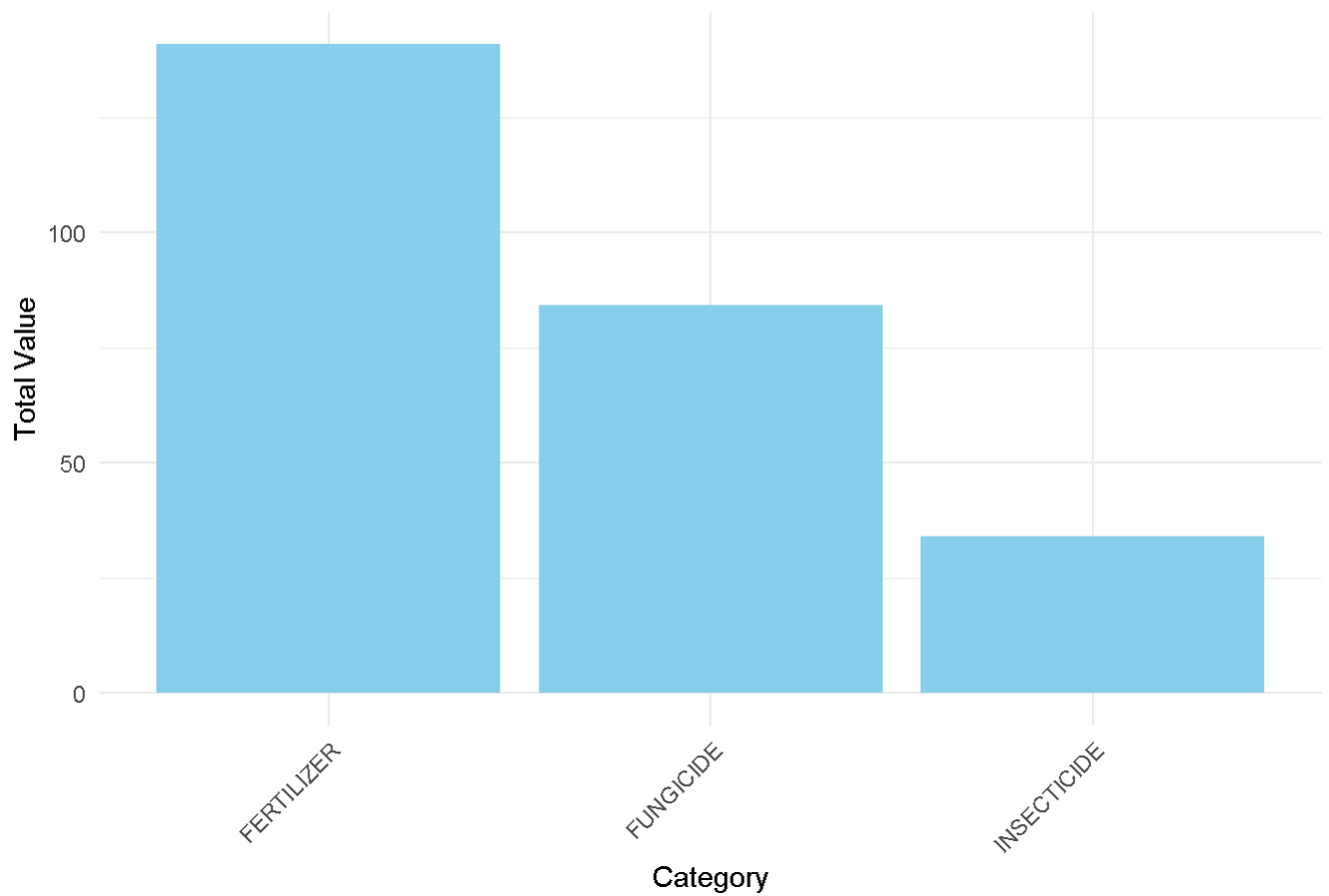
Total Value by Category - FLORIDA (data_3)



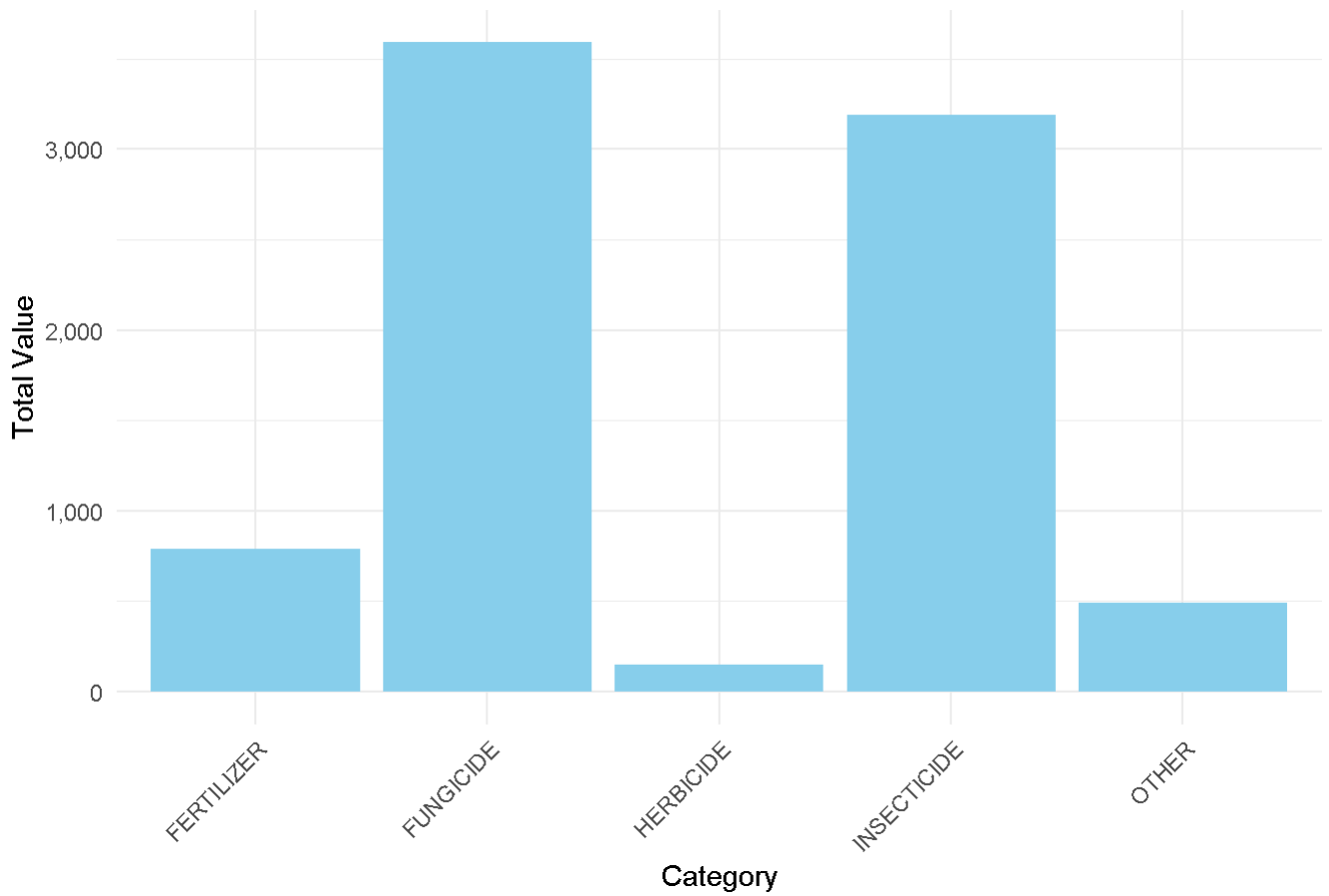
Total Value by Category - CALIFORNIA (data_4)



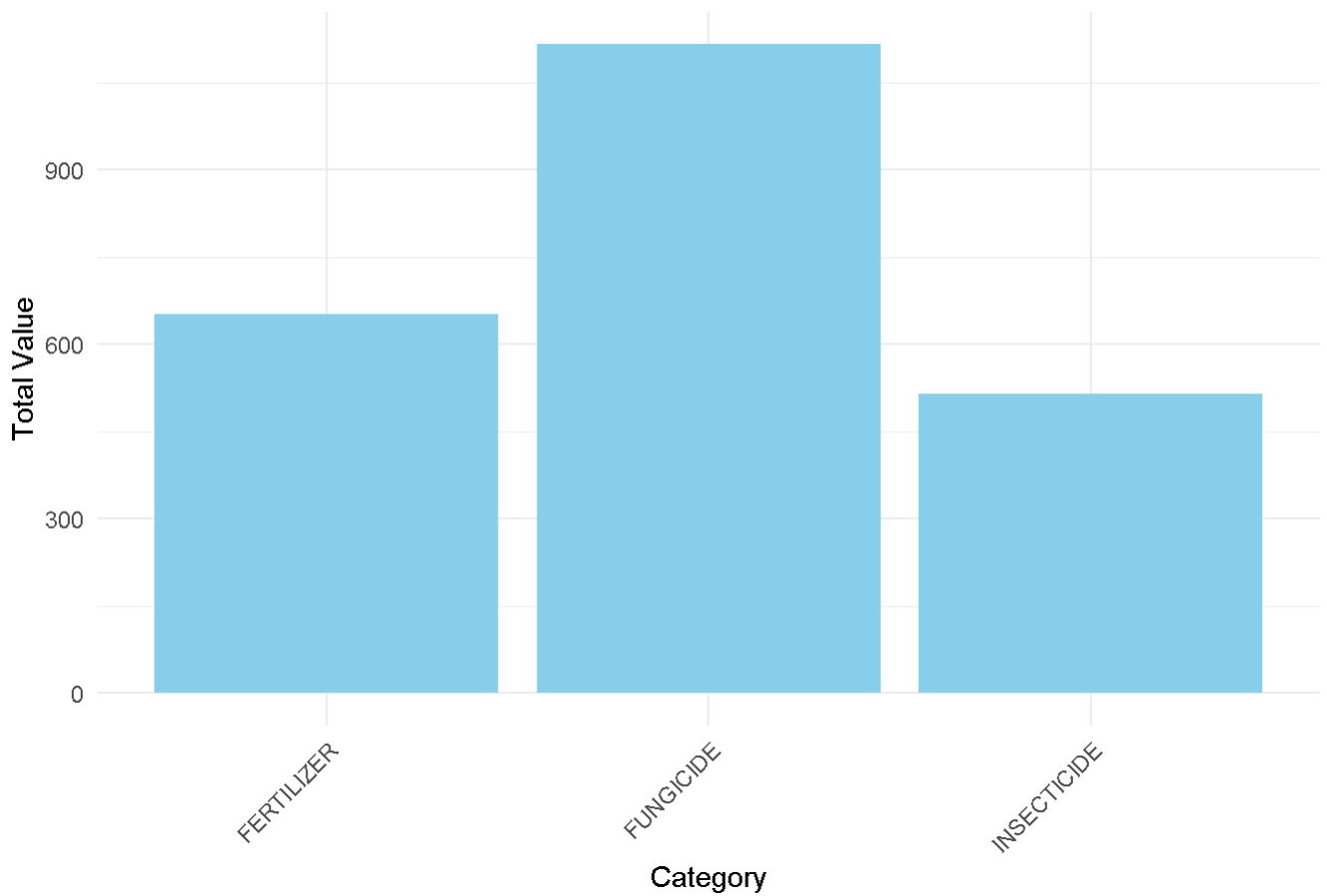
Total Value by Category - FLORIDA (data_4)



Total Value by Category - CALIFORNIA (data_5)



Total Value by Category - FLORIDA (data_5)



```
data=strawberry_chemical
```

```
data <- data %>%
```

```
  mutate(MEASURED = ifelse(grepl("MEASURED IN", information),
```

```

      sub(".*MEASURED IN\\s+(.+)", "\\1", information),
      NA)) %>%
  filter(Name != "TOTAL") %>%
  filter(!Value %in% c("(NA)", "(D)", "(Z)"))

unique(data$Category)

## [1] "FUNGICIDE" "HERBICIDE" "INSECTICIDE" "OTHER" "FERTILIZER"

unique(data$State)


## [1] "CALIFORNIA" "FLORIDA"

years_to_loop <- c(2023, 2021, 2019, 2018)


for (year in years_to_loop) {

  data_1_clean_CA <- data_1 %>%
    mutate(Value = as.numeric(gsub(",", "", Value))) %>%
    filter(!is.na(Value)) %>%
    filter(State == 'CALIFORNIA') %>%
    filter(Category == "FERTILIZER") %>%
    filter(Year == year) %>%
    arrange(desc(Value)) %>%
    select(Name, Value)

  cat("Results for Year:", year, "\n")
  print(head(data_1_clean_CA, 3))
  cat("\n")
}

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA


## Results for Year: 2023
##      Name  Value
## 1 NITROGEN 393000
## 2  POTASH 393000
## 3 PHOSPHATE 216000

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA


```

```

## Results for Year: 2021
## [1] Name Value
## <0 行> (或 0-长度的 row.names)


## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA

## Results for Year: 2019
##      Name Value
## 1 NITROGEN 668000
## 2 PHOSPHATE 493000
## 3 POTASH 430000

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA

## Results for Year: 2018
##      Name Value
## 1 NITROGEN 10676000
## 2 POTASH 10583000
## 3 PHOSPHATE 5745000

##install.packages('PubChemR')
library(tidyverse)

## — Attaching core tidyverse packages ————— tidyverse 2.0.0 —
## ✓ forcats 1.0.0 ✓ stringr 1.5.1
## ✓ lubridate 1.9.3 ✓ tibble 3.2.1
## ✓ purrr 1.0.2 ✓ tidyr 1.3.1
## ✓ readr 2.1.5
## — Conflicts ————— tidyverse_conflicts() —
## * readr::col_factor() masks scales::col_factor()
## * purrr::discard() masks scales::discard()
## * dplyr::filter() masks stats::filter()
## * dplyr::lag() masks stats::lag()
##  Use the conflicted package (<http://conflicted.r-lib.org/>) to force all
conflicts to become errors

library(PubChemR)

GHS_searcher<-function(result_json_object){
  result<-result_json_object
  for (i in 1:length(result[["result"]][["Hierarchies"]][["Hierarchy"]])){
    if(result[["result"]][["Hierarchies"]][["Hierarchy"]][[i]][["SourceName"]]=="GHS

```

```

Classification (UNECE)){
  return(i)
}

}
}

hazards_retriever<-function(index,result_json_object){
  result<-result_json_object
  hierarchy<-result[["result"]][["Hierarchies"]][["Hierarchy"]][[index]]
  i<-1
  output_list<-rep(NA,length(hierarchy[["Node"]]))
  while(str_detect(hierarchy[["Node"]][[i]][["Information"]][["Name"]], "H") &
i<length(hierarchy[["Node"]])){
  output_list[i]<-hierarchy[["Node"]][[i]][["Information"]][["Name"]]
  i<-i+1
}
  return(output_list[!is.na(output_list)])
}

result_f<-get_pug_rest(identifier = "NITROGEN", namespace = "name", domain =
"compound",operation="classification", output = "JSON")

hazards_retriever(GHS_searcher(result_f),result_f)

## [1] "H280: Contains gas under pressure; may explode if heated [Warning Gases
under pressure]"
## [2] "H200: Physical Hazards"
## [3] "Hazard Statement Codes"
## [4] "H281: Contains refrigerated gas; may cause cryogenic burns or injury
[Warning Gases under pressure]"
## [5] "H317: May cause an allergic skin reaction [Warning Sensitization, Skin]"
## [6] "H300: Health Hazards"
## [7] "H319: Causes serious eye irritation [Warning Serious eye damage/eye
irritation]"
## [8] "H400: Very toxic to aquatic life [Warning Hazardous to the aquatic
environment, acute hazard]"
## [9] "H400: Environmental Hazards"
## [10] "H410: Very toxic to aquatic life with long lasting effects [Warning
Hazardous to the aquatic environment, long-term hazard]"

years_to_loop <- c(2023, 2021, 2019, 2018)

for (year in years_to_loop) {


  data_1_clean_FL <- data_1 %>%
    mutate(Value = as.numeric(gsub(",", "", Value))) %>%

```


```

    filter(!is.na(Value)) %>%
    filter(State == 'FLORIDA') %>%
    filter(Category == "FERTILIZER") %>%
    filter(Year == year) %>%
    arrange(desc(Value)) %>%
    select(Name, Value)


cat("Results for Year:", year, "\n")
print(head(data_1_clean_FL, 3))
cat("\n")
}

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA


## Results for Year: 2023
##      Name  Value
## 1  POTASH 538000
## 2 NITROGEN 283000
## 3 PHOSPHATE 52000

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA

## Results for Year: 2021
## [1] Name  Value
## <0 行> (或 0-长度的 row.names)

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA

## Results for Year: 2019
##      Name  Value
## 1  POTASH 389000
## 2 NITROGEN 320000
## 3 PHOSPHATE 86000

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA

```

```
## Results for Year: 2018
```

```
##      Name  Value
## 1   POTASH 173000
## 2  NITROGEN 136000
## 3 PHOSPHATE  42000
```

##Potassium is the third major plant and crop nutrient after nitrogen and phosphorus. It has been used since antiquity as a soil fertilizer (about 90% of current use).Fertilizer use is the main driver behind potash consumption, especially for its use in fertilizing crops that contribute to high-protein diets. As of at least 2010, more than 95% of potash is mined for use in agricultural purposes.

```
years_to_loop <- c(2023, 2021, 2019, 2018)
```

```
for (year in years_to_loop) {
```

```
  data_1_clean_CA <- data_2%>%
    mutate(Value = as.numeric(gsub(",", "", Value))) %>%
    filter(!is.na(Value)) %>%
    filter(State == 'CALIFORNIA') %>%
    filter(Category == "OTHER") %>%
    filter(Year == year) %>%
    arrange(desc(Value)) %>%
    select(Name, Value)
```

```
  cat("Results for Year:", year, "\n")
  print(head(data_1_clean_FL, 3))
  cat("\n")
```

```
}
```

```
## Warning: There was 1 warning in `mutate()`.
```

```
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
```

```
## Caused by warning:
```

```
## ! 强制改变过程中产生了NA
```

```
## Results for Year: 2023
```

```
##      Name  Value
## 1   POTASH 173000
## 2  NITROGEN 136000
## 3 PHOSPHATE  42000
```

```
## Warning: There was 1 warning in `mutate()`.
```

```
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
```


```
## Caused by warning:
```

```
## ! 强制改变过程中产生了NA
```


```
## Results for Year: 2021
```

```

##           Name  Value
## 1      POTASH 173000
## 2    NITROGEN 136000
## 3  PHOSPHATE  42000

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了NA

## Results for Year: 2019
##           Name  Value
## 1      POTASH 173000
## 2    NITROGEN 136000
## 3  PHOSPHATE  42000

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了NA


## Results for Year: 2018
##           Name  Value
## 1      POTASH 173000
## 2    NITROGEN 136000
## 3  PHOSPHATE  42000

years_to_loop <- c(2023, 2021, 2019, 2018)

for (year in years_to_loop) {

  data_2_clean_FL <- data_2 %>%
    mutate(Value = as.numeric(gsub(",", "", Value))) %>%
    filter(!is.na(Value)) %>%
    filter(State == 'FLORIDA') %>%
    filter(Category == "FERTILIZER") %>%
    filter(Year == year) %>%
    arrange(desc(Value)) %>%
    select(Name, Value)

  cat("Results for Year:", year, "\n")
  print(head(data_2_clean_FL, 3))
  cat("\n")
}

## Warning: There was 1 warning in `mutate()`.
##  In argument: `Value = as.numeric(gsub(",", "", Value))`.

```

```

## Caused by warning:
## ! 强制改变过程中产生了 NA

## Results for Year: 2023
##      Name Value
## 1   POTASH    22
## 2  NITROGEN    12
## 3 PHOSPHATE     4

## Warning: There was 1 warning in `mutate()`.
## [i] In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA

## Results for Year: 2021
## [1] Name Value
## <0 行> (或 0-长度的 row.names)

## Warning: There was 1 warning in `mutate()`.
## [i] In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA

## Results for Year: 2019
##      Name Value
## 1   POTASH     2
## 2  NITROGEN     1
## 3 PHOSPHATE     1

## Warning: There was 1 warning in `mutate()`.
## [i] In argument: `Value = as.numeric(gsub(",", "", Value))`.
## Caused by warning:
## ! 强制改变过程中产生了 NA

## Results for Year: 2018
##      Name Value
## 1 NITROGEN     1
## 2   POTASH     1

years_to_loop <- c(2023, 2021, 2019, 2018)

for (year in years_to_loop) {

  data_3_clean_CA <- data_3%>%
    mutate(Value = as.numeric(gsub(",", "", Value))) %>%
    filter(!is.na(Value)) %>%

```



```

    filter(State == 'CALIFORNIA') %>%
    filter(Category == "FERTILIZER") %>%
    filter(Year == year) %>%
    arrange(desc(Value)) %>%
    select(Name, Value)

    cat("Results for Year:", year, "\n")
    print(head(data_3_clean_CA, 3))
    cat("\n")
}

```

```

## Results for Year: 2023
##      Name Value
## 1  NITROGEN   165
## 2   POTASH   141
## 3 PHOSPHATE    88
##
## Results for Year: 2021
## [1] Name Value
## <0 行> (或 0-长度的 row.names)
##
## Results for Year: 2019
##      Name Value
## 1 PHOSPHATE    86
## 2   POTASH    75
## 3  NITROGEN    58
##
## Results for Year: 2018
##      Name Value
## 1   POTASH   315
## 2  NITROGEN  307
## 3 PHOSPHATE  172

```

##Balancing Potash Mining and Sustainable Development Goals ##Potash mining is an essential industry that supports agricultural production worldwide. However, the extraction of potash ore can also have significant environmental impacts, highlighting the need for sustainable development practices.Potash mining projects must balance economic growth with environmental protection to ensure that future generations can continue to benefit from this finite resource.The extraction of tons of ore can have a specific activity that needs to be monitored over time to ensure compliance with environmental regulations.Therefore, it is crucial to implement monitoring programs that collect and analyze data on the total activity levels of the mine and its impact on the environment.