# HW3_GUO

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## Problem 3

a.Sensory data from five operators

```
#install.packages("tibble")
library(tibble)
#install.packages("dplyr")
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

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

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

```
url<-"https://www2.isye.gatech.edu/~jeffwu/wuhamadabook/data/Sensory.dat"
a<-read.table(url,header=T,sep=" ",skip=1,fill=T)
a1<-filter(a,!is.na(X5))
a2<-filter(a,is.na(X5))
Item<-c()
for(i in 1:10){Item<-c(Item,rep(i,2))}
a22<-a2%>%select(Item:X4)%>%`colnames<-`(c("X1", "X2", "X3",'X4','X5'))
a22<-cbind(Item,a22)
a<-rbind(a22,a1)
a%>%arrange(Item)
```

```
##    Item  X1  X2  X3  X4  X5
## 1     1 4.3 4.5 4.0 5.5 3.3
## 2     1 4.1 5.3 3.4 5.7 4.7
## 3     1 4.3 4.9 3.3 5.3 4.4
## 4     2 4.9 6.3 4.2 5.5 4.9
## 5     2 6.0 5.9 4.7 6.3 4.6
## 6     2 6.0 5.3 4.5 5.9 4.7
## 7     3 3.9 3.0 2.8 2.7 1.3
## 8     3 1.9 3.9 2.6 4.6 2.2
## 9     3 2.4 2.5 2.3 3.1 2.4
## 10    4 7.1 7.9 5.9 7.3 6.1
## 11    4 6.4 7.1 6.9 7.0 6.7
## 12    4 7.4 8.2 6.4 6.8 6.0
## 13    5 5.8 5.7 5.4 6.2 6.5
## 14    5 5.8 6.0 6.1 7.0 4.9
## 15    5 5.7 6.3 5.4 6.1 5.9
## 16    6 3.0 1.8 2.1 4.0 1.7
## 17    6 2.1 3.3 1.1 3.3 2.1
## 18    6 2.2 2.4 1.7 3.4 1.7
```

```
## 19    7 1.3 2.4 0.8 1.2 1.3
## 20    7 0.9 3.1 1.1 1.9 1.6
## 21    7 1.2 1.5 1.2 0.9 0.7
## 22    8 3.0 4.5 4.7 4.9 4.6
## 23    8 4.8 4.8 4.7 4.8 4.3
## 24    8 4.2 4.8 4.5 4.6 3.2
## 25    9 9.0 7.7 6.7 9.0 7.9
## 26    9 8.9 9.2 8.1 9.1 7.6
## 27    9 8.0 8.6 9.0 9.4 8.8
## 28   10 5.4 5.0 3.4 4.9 4.6
## 29   10 2.8 5.2 4.1 3.9 5.5
## 30   10 5.0 4.8 3.9 5.5 3.8
```

b.Gold Medal performance

```
url<-"https://www2.isye.gatech.edu/~jeffwu/wuhamadabook/data/LongJumpData.dat"
a<-read.table(url,sep=" ",skip=1,fill=T)
a=as.data.frame(a)
a<-rbind(as.matrix(a[,1:2]),as.matrix(a[,3:4]),as.matrix(a[,5:6]),as.matrix(a[,7:8]))
a_new<-a%>%as.data.frame()%>%filter(!is.na(V1&V2))%>%`colnames<-`(c("year","long_jump"))
summarise_at(a_new, vars(long_jump),list(~n(),  ~mean(., na.rm = TRUE),~median(.,na.rm = TRUE)))
```

```
##    n     mean  median
## 1 22 310.2873 308.125
```

```
summary(lm(long_jump~year,a_new))
```

```
##
## Call:
## lm(formula = long_jump ~ year, data = a_new)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -25.4665  -4.4821  -0.8236   6.3372  24.2246
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 278.05315    4.25339  65.372  < 2e-16 ***
## year          0.70915    0.07801   9.091 1.53e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 11.02 on 20 degrees of freedom
## Multiple R-squared:  0.8052, Adjusted R-squared:  0.7954
## F-statistic: 82.64 on 1 and 20 DF,  p-value: 1.532e-08
```

c.Brain weight (g) and body weight (kg)

```
url<-"https://www2.isye.gatech.edu/~jeffwu/wuhamadabook/data/BrainandBodyWeight.dat"
a<-read.table(url,sep=" ",skip=1,fill=T)
a<-rbind(as.matrix(a[,1:2]),as.matrix(a[,3:4]),as.matrix(a[,5:6]))
a<-a[1:62,]
a<-as.data.frame(a)
colnames(a)<-c("Body WT","Brain WT")
a
```

```
##     Body WT Brain WT
```

```
## 1     3.385    44.50
## 2     0.480    15.50
## 3     1.350     8.10
## 4   465.000   423.00
## 5    36.330   119.50
## 6    27.660   115.00
## 7    14.830    98.20
## 8     1.040     5.50
## 9     4.190    58.00
## 10    0.425     6.40
## 11    0.101     4.00
## 12    0.920     5.70
## 13    1.000     6.60
## 14    0.005     0.10
## 15    0.060     1.00
## 16    3.500    10.80
## 17    2.000    12.30
## 18    1.700     6.30
## 19 2547.000  4603.00
## 20    0.023     0.30
## 21  187.100   419.00
## 22  521.000   655.00
## 23    0.785     3.50
## 24   10.000   115.00
## 25    3.300    25.60
## 26    0.200     5.00
## 27    1.410    17.50
## 28  529.000   680.00
## 29  207.000   406.00
## 30   85.000   325.00
## 31    0.750    12.30
## 32   62.000  1320.00
## 33 6654.000  5712.00
## 34    3.500     3.90
## 35    6.800   179.00
## 36   35.000    56.00
## 37    4.050    17.00
## 38    0.120     1.00
## 39    0.023     0.40
## 40    0.010     0.30
## 41    1.400    12.50
## 42  250.000   490.00
## 43    2.500    12.10
## 44   55.500   175.00
## 45  100.000   157.00
## 46   52.160   440.00
## 47   10.550   179.50
## 48    0.550     2.40
## 49   60.000    81.00
## 50    3.600    21.00
## 51    4.288    39.20
## 52    0.280     1.90
## 53    0.075     1.20
## 54    0.122     3.00
```

```
## 55    0.048     0.33
## 56  192.000   180.00
## 57    3.000    25.00
## 58  160.000   169.00
## 59    0.900     2.60
## 60    1.620    11.40
## 61    0.104     2.50
## 62    4.235    50.40
```

```
summarise_at(a, vars(c("Body WT","Brain WT")),list(~n(),  ~mean(., na.rm = TRUE),~median(.,na.rm = TRUE
```

```
##   Body WT_n Brain WT_n Body WT_mean Brain WT_mean Body WT_median
## 1        62         62       198.79      283.1344         3.3425
##   Brain WT_median
## 1           17.25
```

d.Triplicate measurements of tomato yield

```
library(stringr)
url<-"https://www2.isye.gatech.edu/~jeffwu/wuhamadabook/data/tomato.dat"
a<-read.table(url,sep="",skip=1,fill=T,comment.char="")
a<-as.data.frame(a)
d<-c()
for (i in 1:2){
  for (j in 1:3){
    bi_j<-a[i,j]
    bi_j<-unlist(str_split(bi_j,","))
    bi_j<-as.numeric(bi_j[1:3])
    d<-c(d,bi_j)
  }
}
b1<-d[1:9]
b2<-d[10:18]
b3<-c(rep(10000,3),rep(20000,3),rep(30000,3))
dataframe<-tibble(b3,b1,b2)
colnames(dataframe)<-c("Number","Ife\\#1","PusaEarlyDwarf")
dataframe<--as.data.frame(dataframe)
summarise_at(dataframe, vars(c("Ife\\#1","PusaEarlyDwarf")),list(~n(),  ~mean(., na.rm = TRUE),~median(
```

```
##   Ife\\#1_n PusaEarlyDwarf_n Ife\\#1_mean PusaEarlyDwarf_mean
## 1         9                9    -18.11111           -12.02222
##   Ife\\#1_median PusaEarlyDwarf_median
## 1            -18                 -12.7
```

```
t = dataframe %>% group_by(Number) %>%
  summarise_at(vars("Ife\\#1":"PusaEarlyDwarf"), funs(n(), mean(., na.rm = TRUE)))
```

```
## Warning: funs() is soft deprecated as of dplyr 0.8.0
## Please use a list of either functions or lambdas:
##
##   # Simple named list:
##   list(mean = mean, median = median)
##
##   # Auto named with `tibble::lst()`:
##   tibble::lst(mean, median)
##
##   # Using lambdas
```

```
##   list(~ mean(., trim = .2), ~ median(., na.rm = TRUE))
## This warning is displayed once per session.
```

```
t
```

```
## # A tibble: 3 x 5
##   Number `Ife\\#1_n` PusaEarlyDwarf_n `Ife\\#1_mean` PusaEarlyDwarf_mean
##    <dbl>       <int>            <int>          <dbl>               <dbl>
## 1 -30000           3                3          -19.9              -14.5
## 2 -20000           3                3          -18.1              -12.6
## 3 -10000           3                3          -16.3               -8.93
```

## Praoblem 5

```
#install.packages("swirl")
library(swirl)
```

```
##
## | Hi! I see that you have some variables saved in your workspace. To keep
## | things running smoothly, I recommend you clean up before starting swirl.
##
## | Type ls() to see a list of the variables in your workspace. Then, type
## | rm(list=ls()) to clear your workspace.
##
## | Type swirl() when you are ready to begin.
```

```
install_course("R_Programming_E")
```

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##
## | Course installed successfully!
```

```
swirl()
bye()
```

```
##
## | Leaving swirl now. Type swirl() to resume.
```

```
# Path to data
.datapath <- file.path(path.package('swirl'), 'Courses',
                       'R_Programming_E', 'Looking_at_Data',
                       'plant-data.txt')
# Read in data
plants <- read.csv(.datapath, strip.white=TRUE, na.strings="")
.cols2rm <- c('Accepted.Symbol', 'Synonym.Symbol')
plants <- plants[, !(names(plants) %in% .cols2rm)]
# Make names pretty
names(plants) <- c('Scientific_Name', 'Duration', 'Active_Growth_Period',
                   'Foliage_Color', 'pH_Min', 'pH_Max',
                   'Precip_Min', 'Precip_Max',
                   'Shade_Tolerance', 'Temp_Min_F')
na_plants<-apply(is.na(plants),1,sum)
plants<-plants[-which((na_plants)>0),]
plants_1<-plants%>%select(c('Scientific_Name','Foliage_Color', 'pH_Min', 'pH_Max'))
plants<-plants_1
plants$PH_Mean<-(plants$pH_Min+plants$pH_Max)/2
plants$Foliage_Color<-factor(plants$Foliage_Color)
plants
```

```
##                                    Scientific_Name Foliage_Color pH_Min
## 4                                    Abies balsamea         Green    4.0
## 9                                  Acacia constricta         Green    7.0
## 14                                Acalypha virginica         Green    5.9
## 17                                      Acer negundo         Green    5.0
## 19                                       Acer nigrum         Green    4.5
## 20                                 Acer pensylvanicum         Green    4.4
## 21                                   Acer platanoides         Green    4.8
## 22                                 Acer pseudoplatanus  Yellow-Green    5.8
## 23                                       Acer rubrum         Green    4.7
## 26                                  Acer saccharinum         Green    4.0
## 27                                    Acer saccharum         Green    3.7
## 29                                     Acer spicatum         Green    4.8
## 31                                Achillea millefolium         Green    6.0
## 32          Achillea millefolium var. occidentalis         Green    6.0
## 43                                    Acorus calamus         Green    5.2
## 51                          Adiantum capillus-veneris         Green    6.0
## 52                                   Adiantum pedatum    Dark Green    4.6
## 63                                    Aesculus flava         Green    5.0
## 90                               Agrimonia gryposepala         Green    4.5
## 92                                Agrimonia parviflora         Green    6.0
## 94                                Agrimonia rostellata         Green    4.5
## 95                                   Agrimonia striata         Green    5.5
## 99                                    Agrostis canina         Green    5.0
## 100                                Agrostis capillaris         Green    4.9
## 102                                  Agrostis gigantea         Green    4.5
## 103                                  Agrostis hyemalis         Green    5.0
```

```
## 104                    Agrostis perennans        Green   5.5
## 105                       Agrostis scabra        Green   6.0
## 106                   Agrostis stolonifera        Green   5.1
## 108                    Ailanthus altissima        Green   4.1
## 117                          Ajuga reptans        Green   5.5
## 121                    Albizia julibrissin   White-Gray   4.8
## 128                    Alisma subcordatum        Green   5.0
## 146                          Alnus incana        Green   5.0
## 147                Alnus incana ssp. rugosa   Dark Green   4.8
## 148                        Alnus maritima        Green   5.0
## 149                       Alnus serrulata        Green   5.0
## 151                    Alopecurus aequalis        Green   5.5
## 153                 Alopecurus carolinianus        Green   4.0
## 154                  Alopecurus geniculatus        Green   4.0
## 156                  Alopecurus myosuroides        Green   4.0
## 157                    Alopecurus pratensis        Green   5.8
## 187                    Amelanchier arborea   Dark Green   4.8
## 189                 Amelanchier canadensis        Green   5.5
## 192                     Amelanchier laevis        Green   4.8
## 194                    Amelanchier obovalis   Dark Green   5.0
## 195                  Amelanchier sanguinea        Green   4.5
## 201                     Ammannia coccinea        Green   4.0
## 204                     Ammophila arenaria        Green   6.0
## 205                Ammophila breviligulata        Green   5.8
## 207                      Amorpha fruticosa        Green   5.0
## 209                     Ampelopsis arborea        Green   4.0
## 211                     Ampelopsis cordata        Green   5.2
## 226                  Anaphalis margaritacea        Green   6.0
## 231                    Andropogon gerardii        Green   6.0
## 233                   Andropogon glomeratus        Green   5.0
## 238                   Andropogon ternarius        Green   4.0
## 240                   Andropogon virginicus        Green   4.9
## 258                    Antennaria neglecta   Dark Green   5.5
## 279                        Apios americana        Green   6.0
## 286                    Apocynum cannabinum        Green   4.5
## 307                     Aralia nudicaulis   Dark Green   5.0
## 310                        Aralia spinosa        Green   4.8
## 316                Arctostaphylos uva-ursi   Dark Green   5.5
## 326                     Argentina anserina        Green   7.0
## 329                    Arisaema triphyllum        Green   4.8
## 359                   Arrhenatherum elatius        Green   5.0
## 368                   Artemisia ludoviciana   White-Gray   6.0
## 381                   Arundinaria gigantea   Dark Green   5.0
## 384                         Arundo donax        Green   4.8
## 390                    Asclepias incarnata        Green   5.0
## 400                    Asclepias tuberosa        Green   4.8
## 406                       Asimina triloba   Dark Green   4.7
## 438                   Astragalus canadensis        Green   6.0
## 444                   Athyrium filix-femina        Green   4.5
## 466                          Avena fatua        Green   6.0
## 467                         Avena sativa        Green   5.3
## 473                   Baccharis halimifolia   Dark Green   5.5
## 479                     Bacopa rotundifolia        Green   5.4
## 488                      Baptisia tinctoria   Gray-Green   5.8
```

```
## 504                          Berberis thunbergii    Dark Green    5.5
## 511                        Betula alleghaniensis         Green    4.0
## 514                                Betula lenta          Green    3.6
## 515                                Betula nigra          Green    3.0
## 516                           Betula papyrifera          Green    4.2
## 518                          Betula populifolia          Green    3.5
## 522                             Bidens aristosa          Green    5.0
## 526                               Bidens cernua          Green    5.1
## 527                              Bidens connata          Green    5.2
## 528                             Bidens coronata          Green    5.2
## 529                            Bidens discoidea          Green    5.1
## 530                             Bidens frondosa          Green    5.2
## 531                               Bidens laevis          Green    5.0
## 532                                Bidens mitis          Green    5.0
## 535                            Bidens tripartita          Green    5.0
## 546                          Boehmeria cylindrica          Green    5.1
## 552                           Boltonia asteroides          Green    5.3
## 557                          Borrichia frutescens          Green    6.1
## 559                          Bothriochloa pertusa          Green    5.0
## 564                        Botrychium lanceolatum          Green    4.4
## 570                        Botrychium virginianum          Green    5.6
## 575                        Bouteloua curtipendula          Green    5.5
## 577                             Bouteloua hirsuta          Green    6.0
## 586                               Brassica juncea    Dark Green    6.0
## 587                                Brassica napus    Dark Green    6.0
## 590                                Brassica rapa          Green    5.0
## 599                             Bromus arvensis          Green    5.2
## 600                           Bromus briziformis          Green    5.3
## 601                           Bromus catharticus          Green    5.5
## 602                              Bromus ciliatus          Green    5.5
## 607          Bromus hordeaceus ssp. hordeaceus          Green    5.5
## 608                              Bromus inermis          Green    5.5
## 611                               Bromus kalmii          Green    5.7
## 617                               Bromus rubens          Green    6.0
## 639                          Cabomba caroliniana    Gray-Green    5.7
## 642                                Cajanus cajan          Green    5.0
## 650                      Calamagrostis canadensis          Green    4.5
## 652                       Calamagrostis coarctata          Green    4.0
## 664                          Callicarpa americana          Green    4.8
## 671                         Callitriche palustris          Green    5.2
## 678                              Caltha palustris          Green    4.9
## 694                          Camassia scilloides          Green    4.2
## 700                        Campanula aparinoides          Green    6.0
## 705                     Campanulastrum americanum          Green    5.5
## 707                           Campsis radicans          Green    4.9
## 718                        Caragana arborescens          Green    5.0
## 721                           Cardamine bulbosa          Green    5.0
## 724                         Cardamine douglassii          Green    6.0
## 730                       Cardamine pensylvanica          Green    4.8
## 741                             Carex abscondita          Green    4.8
## 750                          Carex albolutescens          Green    4.3
## 752                              Carex amphibola          Green    5.9
## 755                              Carex aquatilis          Green    4.0
## 760                              Carex atlantica          Green    4.5
```

```
## 764                      Carex baileyi         Green    4.8
## 766                       Carex blanda         Green    4.4
## 773                       Carex bushii         Green    5.8
## 775                    Carex canescens    Gray-Green    5.1
## 782                 Carex cephalophora         Green    4.8
## 786                       Carex comosa         Green    4.6
## 791                      Carex crinita         Green    4.0
## 794                   Carex cristatella         Green    4.9
## 796                      Carex debilis         Green    4.6
## 801                   Carex decomposita         Green    4.5
## 802                      Carex diandra         Green    5.0
## 812                     Carex echinata         Green    5.6
## 820                  Carex flaccosperma    Gray-Green    4.6
## 822                       Carex frankii         Green    5.9
## 824                   Carex glaucescens         Green    4.0
## 827                    Carex gracillima    Dark Green    4.7
## 828                    Carex granularis         Green    6.0
## 832                         Carex grayi         Green    5.7
## 841                  Carex hyalinolepis    Gray-Green    5.6
## 843                     Carex interior         Green    5.4
## 844                   Carex intumescens    Dark Green    4.8
## 846                       Carex joorii         Green    4.7
## 849                     Carex lacustris         Green    5.6
## 859                     Carex leptalea         Green    4.8
## 862                   Carex leptonervia         Green    5.0
## 869                     Carex lupulina         Green    6.2
## 870                       Carex lurida         Green    4.9
## 875                      Carex molesta         Green    4.9
## 881                     Carex normalis         Green    4.7
## 892                    Carex polymorpha    Dark Green    4.8
## 893                      Carex prasina         Green    4.8
## 894                     Carex projecta         Green    4.8
## 902                     Carex scabrata         Green    4.7
## 903                     Carex scoparia         Green    4.6
## 906                    Carex shortiana         Green    4.7
## 909                 Carex sparganioides    Dark Green    5.0
## 911                     Carex squarrosa         Green    5.6
## 912                       Carex stipata         Green    4.9
## 915                    Carex straminea         Green    4.7
## 920                      Carex stricta         Green    3.5
## 923                       Carex tenera         Green    4.9
## 929                        Carex torta         Green    5.0
## 930                   Carex tribuloides         Green    4.8
## 933                   Carex trichocarpa         Green    5.7
## 934                     Carex trisperma         Green    4.5
## 937                      Carex typhina         Green    5.7
## 939                   Carex utriculata         Green    5.7
## 943                     Carex vesicaria         Green    4.5
## 946                      Carex viridula         Green    4.5
## 947                   Carex vulpinoidea         Green    6.8
## 952                Carpinus caroliniana         Green    4.0
## 958                   Carya cordiformis         Green    4.8
## 959                         Carya glabra         Green    4.8
## 960                 Carya illinoinensis  Yellow-Green    4.5
```

```
## 961                          Carya laciniosa         Green    5.0
## 963                              Carya ovata         Green    4.0
## 967                         Castanea dentata  Yellow-Green    5.5
## 972                       Castilleja coccinea         Green    4.9
## 974                      Catalpa bignonioides         Green    5.5
## 976                         Catalpa speciosa    Dark Green    5.5
## 978                Caulophyllum thalictroides         Green    4.5
## 980                      Ceanothus americanus         Green    4.3
## 982                     Celastrus orbiculatus         Green    5.0
## 983                        Celastrus scandens         Green    5.0
## 987                         Celtis laevigata         Green    4.4
## 989                       Celtis occidentalis         Green    6.0
## 1017                Cephalanthus occidentalis         Green    4.7
## 1031                  Ceratophyllum demersum    Gray-Green    6.0
## 1034                       Cercis canadensis         Green    5.0
## 1037                    Chaenomeles japonica         Green    4.5
## 1049                Chamaecrista fasciculata         Green    5.5
## 1056                  Chamaecyparis thyoides         Green    3.5
## 1058                 Chamaedaphne calyculata  Yellow-Green    5.0
## 1075                 Chasmanthium latifolium         Green    5.0
## 1076                      Chasmanthium laxum         Green    4.5
## 1104                      Chenopodium rubrum         Green    6.0
## 1112                     Chimaphila umbellata         Green    5.4
## 1115                  Chionanthus virginicus         Green    4.5
## 1133                       Cichorium intybus         Green    6.0
## 1139                       Cinna arundinacea         Green    4.0
## 1140                         Cinna latifolia         Green    4.7
## 1142                          Circaea alpina         Green    5.0
## 1178                      Clematis virginiana         Green    5.0
## 1187                        Clethra alnifolia         Green    4.5
## 1191                      Clintonia borealis         Green    5.0
## 1198                      Coelorachis rugosa         Green    5.0
## 1212                       Commelina diffusa  Yellow-Green    5.2
## 1216                      Commelina virginica         Green    4.7
## 1218                      Comptonia peregrina         Green    4.0
## 1222                 Conoclinium coelestinum         Green    5.5
## 1231                     Convallaria majalis         Green    5.5
## 1235                       Conyza canadensis         Green    4.8
## 1250                    Coreopsis lanceolata         Green    6.0
## 1252                     Coreopsis tinctoria         Green    5.2
## 1259                     Cornus alternifolia    Dark Green    4.8
## 1260                           Cornus amomum         Green    5.0
## 1261                     Cornus canadensis    Dark Green    5.5
## 1262                        Cornus florida         Green    4.8
## 1263                        Cornus foemina         Green    5.8
## 1265                       Cornus racemosa         Green    4.8
## 1266                         Cornus rugosa         Green    6.4
## 1268          Cornus sericea ssp. sericea         Green    4.8
## 1275                     Corydalis flavula    White-Gray    4.8
## 1278                     Corylus americana         Green    5.0
## 1279                       Corylus cornuta         Green    4.8
## 1292                  Crataegus crus-galli         Green    4.5
## 1304                 Crataegus phaenopyrum         Green    4.3
## 1309                     Crataegus viridis  Yellow-Green    4.3
```

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## 1360                          Cydonia oblonga         Green    5.0
## 1371                        Cynodon dactylon         Green    5.0
## 1380                      Cyperus acuminatus         Green    4.9
## 1381                      Cyperus bipartitus         Green    4.5
## 1382                      Cyperus compressus         Green    5.0
## 1388                    Cyperus erythrorhizos    Dark Green    5.0
## 1389                      Cyperus esculentus         Green    5.0
## 1393                      Cyperus flavescens         Green    5.0
## 1400                    Cyperus lancastriensis         Green    5.0
## 1404                         Cyperus odoratus         Green    5.0
## 1406                     Cyperus polystachyos         Green    4.5
## 1408                     Cyperus pseudovegetus         Green    4.6
## 1415                         Cyperus strigosus         Green    6.4
## 1429                      Cytisus scoparius         Green    5.5
## 1432                     Dactylis glomerata         Green    5.0
## 1446                    Danthonia compressa         Green    4.8
## 1459                    Decodon verticillatus         Green    4.9
## 1469                     Deschampsia flexuosa         Green    4.8
## 1476                   Desmanthus illinoensis         Green    5.0
## 1495                    Desmodium paniculatum         Green    6.0
## 1498                      Desmodium perplexum         Green    5.6
## 1520                   Dichanthelium aciculare    Gray-Green    4.0
## 1527                Dichanthelium clandestinum         Green    4.0
## 1528                  Dichanthelium commutatum         Green    4.0
## 1534                  Dichanthelium latifolium         Green    4.0
## 1543                       Dichanthelium ovale         Green    4.0
## 1550                Dichanthelium scabriusculum         Green    4.0
## 1551                    Dichanthelium scoparium    Gray-Green    4.5
## 1563                         Diervilla lonicera    Dark Green    4.8
## 1567                         Digitalis purpurea    Dark Green    5.5
## 1590                      Diospyros virginiana    Dark Green    4.7
## 1602                        Distichlis spicata         Green    6.4
## 1604                        Dodecatheon meadia         Green    4.5
## 1629                       Dryopteris cristata    Dark Green    3.5
## 1642                     Dulichium arundinaceum    Dark Green    4.7
## 1652                          Echinacea pallida         Green    6.5
## 1653                          Echinacea purpurea         Green    6.5
## 1655                          Echinochloa colona         Green    4.0
## 1659                     Echinochloa frumentacea         Green    4.7
## 1663                         Echinochloa walteri         Green    3.8
## 1674                           Eclipta prostrata         Green    5.2
## 1678                      Elaeagnus angustifolia    White-Gray    6.0
## 1679                         Elaeagnus commutata    White-Gray    5.0
## 1681                         Elaeagnus umbellata    White-Gray    5.0
## 1703                           Eleocharis obtusa    Dark Green    4.1
## 1707                        Eleocharis palustris    Dark Green    4.0
## 1713                           Eleocharis tenuis    Dark Green    6.2
## 1721                   Elephantopus carolinianus    Dark Green    5.0
## 1729                           Elodea canadensis    Gray-Green    4.8
## 1732                         Elymus canadensis         Green    5.0
## 1738                             Elymus repens         Green    5.2
## 1739                          Elymus riparius    Dark Green    4.5
## 1742        Elymus trachycaulus ssp. trachycaulus         Green    5.6
## 1744                         Elymus virginicus         Green    5.0
```

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## 1756                          Epilobium coloratum         Green    4.5
## 1758                        Epilobium leptophyllum         Green    4.0
## 1763                             Equisetum arvense         Green    4.0
## 1765                           Equisetum fluviatile         Green    4.5
## 1769                           Equisetum sylvaticum         Green    4.0
## 1774                             Eragrostis curvula         Green    4.5
## 1778                           Eragrostis hypnoides         Green    4.5
## 1787                         Eragrostis spectabilis         Green    4.0
## 1797                        Erigeron philadelphicus         Green    4.8
## 1802                             Erigeron strigosus         Green    4.8
## 1807                         Eriocaulon decangulare    Dark Green    4.0
## 1816                             Eriophorum gracile         Green    4.0
## 1818                          Eriophorum virginicum         Green    3.8
## 1835          Erysimum capitatum var. capitatum         Green    6.0
## 1903                         Eurybia macrophylla    Dark Green    4.9
## 1923                           Fagus grandifolia         Green    4.1
## 1931                               Festuca rubra         Green    5.0
## 1933                       Festuca subverticillata         Green    5.5
## 1959                           Forsythia suspensa         Green    5.0
## 1970                           Fraxinus americana         Green    4.7
## 1971                              Fraxinus nigra         Green    4.4
## 1972                         Fraxinus pennsylvanica  Yellow-Green    4.7
## 1973                           Fraxinus profunda         Green    4.5
## 2000                              Galium aparine         Green    5.4
## 2001                            Galium asprellum         Green    5.0
## 2002                              Galium boreale         Green    5.0
## 2011                              Galium obtusum         Green    4.6
## 2019                            Galium tinctorium         Green    4.6
## 2021                              Galium trifidum         Green    4.6
## 2030                         Gaultheria hispidula    Dark Green    4.0
## 2031                        Gaultheria procumbens    Dark Green    4.0
## 2036                          Gaylussacia baccata         Green    4.5
## 2038                          Gaylussacia dumosa         Green    4.3
## 2039                         Gaylussacia frondosa         Green    3.8
## 2044                          Gentiana andrewsii         Green    5.8
## 2048                             Gentiana clausa         Green    5.8
## 2074                              Geum canadense         Green    4.5
## 2076                              Geum laciniatum         Green    5.0
## 2079                                  Geum rivale         Green    4.8
## 2080                                  Geum vernum         Green    4.8
## 2091                             Glaux maritima         Green    6.5
## 2097                        Gleditsia triacanthos         Green    4.8
## 2102                          Glyceria canadensis         Green    5.0
## 2107                          Glyceria melicaria         Green    4.5
## 2108                             Glyceria obtusa         Green    4.0
## 2110                            Glyceria striata         Green    4.0
## 2112                                 Glycine max         Green    5.5
## 2159                         Hamamelis virginiana         Green    4.5
## 2166                                 Hedera helix         Green    5.2
## 2170                          Helenium autumnale         Green    4.0
## 2172                          Helenium flexuosum         Green    4.5
## 2178                       Helianthus angustifolius    Dark Green    4.0
## 2179                           Helianthus annuus         Green    5.5
## 2180                           Helianthus debilis         Green    5.2
```

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## 2185                  Helianthus grosseserratus    Dark Green    5.8
## 2200                       Helianthus tuberosus  Yellow-Green    4.0
## 2205                  Heliotropium curassavicum    Gray-Green    6.5
## 2223                          Heracleum maximum         Green    5.4
## 2232                        Hesperis matronalis         Green    5.0
## 2254                            Hibiscus laevis         Green    5.5
## 2255                        Hibiscus moscheutos    Gray-Green    4.0
## 2275                             Holcus lanatus    White-Gray    4.0
## 2282                    Hordeum brachyantherum         Green    6.0
## 2289                          Hordeum pusillum         Green    6.2
## 2290                           Hordeum vulgare         Green    5.0
## 2305                         Hudsonia tomentosa    Gray-Green    5.5
## 2333                       Hydrolea quadrivalvis         Green    5.7
## 2349                          Hypericum ascyron         Green    5.7
## 2351                     Hypericum crux-andreae         Green    4.6
## 2352                      Hypericum densiflorum         Green    4.0
## 2353                     Hypericum denticulatum         Green    4.8
## 2357                     Hypericum gentianoides         Green    4.6
## 2362                          Hypericum mutilum         Green    4.6
## 2364                       Hypericum prolificum         Green    4.6
## 2365                       Hypericum punctatum         Green    4.6
## 2370                          Hypoxis hirsuta         Green    5.2
## 2372                             Ilex decidua    Dark Green    3.5
## 2373                             Ilex glabra         Green    4.5
## 2377                             Ilex opaca         Green    4.5
## 2379                        Ilex verticillata         Green    4.5
## 2381                       Impatiens capensis         Green    6.4
## 2382                       Impatiens pallida         Green    6.8
## 2410                          Iris virginica         Green    4.8
## 2426                          Itea virginica         Green    4.0
## 2428                          Iva frutescens         Green    5.0
## 2439                         Juglans cinerea         Green    6.0
## 2440                           Juglans nigra         Green    4.6
## 2442                        Juncus acuminatus         Green    4.4
## 2446                       Juncus articulatus         Green    4.8
## 2447                          Juncus biflorus         Green    4.5
## 2448                       Juncus brachycarpus         Green    4.5
## 2449                     Juncus brachycephalus         Green    5.9
## 2451                         Juncus bufonius         Green    4.6
## 2454                       Juncus canadensis         Green    4.5
## 2458                       Juncus dichotomus           Red    4.5
## 2461                          Juncus effusus    Dark Green    5.5
## 2471                        Juncus marginatus         Green    5.5
## 2472                      Juncus megacephalus         Green    4.5
## 2476                            Juncus repens         Green    5.5
## 2477                       Juncus roemerianus    Dark Green    4.0
## 2478                        Juncus scirpoides         Green    5.6
## 2479                          Juncus secundus         Green    4.9
## 2480                       Juncus subcaudatus         Green    4.5
## 2482                            Juncus tenuis         Green    4.5
## 2483                          Juncus torreyi         Green    4.5
## 2485                          Juncus validus         Green    5.0
## 2488                       Juniperus communis         Green    5.5
## 2490                     Juniperus virginiana         Green    4.7
```

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## 2493                          Justicia americana    Dark Green    5.4
## 2498                            Kalmia latifolia         Green    4.5
## 2506                           Koeleria macrantha         Green    6.0
## 2508                       Koelreuteria paniculata         Green    4.5
## 2517                         Kummerowia stipulacea         Green    5.5
## 2518                            Kummerowia striata         Green    4.9
## 2524                             Lablab purpureus         Green    4.5
## 2526                          Lachnanthes caroliana    Gray-Green    4.0
## 2539                           Lagerstroemia indica         Green    5.0
## 2554                                  Larix decidua  Yellow-Green    6.0
## 2555                                 Larix laricina    Dark Green    5.5
## 2558                             Lathyrus hirsutus  Yellow-Green    5.8
## 2578                          Leersia lenticularis         Green    5.0
## 2579                             Leersia oryzoides    Dark Green    5.1
## 2580                             Leersia virginica         Green    4.5
## 2610                              Leptochloa dubia         Green    6.0
## 2612          Leptochloa fusca ssp. fascicularis         Green    4.0
## 2617                           Lespedeza capitata         Green    5.7
## 2620                              Lespedeza hirta    Dark Green    5.8
## 2631                          Leucanthemum vulgare         Green    5.2
## 2641                               Liatris spicata         Green    5.6
## 2652                           Ligustrum amurense         Green    5.8
## 2653                           Ligustrum japonicum    Dark Green    5.5
## 2656                         Ligustrum ovalifolium         Green    5.9
## 2659                             Ligustrum vulgare         Green    5.0
## 2671                             Limnobium spongia         Green    5.0
## 2673                         Limonium carolinianum         Green    6.0
## 2681                                Lindera benzoin         Green    4.5
## 2697                                 Linum striatum         Green    5.0
## 2708                       Liquidambar styraciflua         Green    4.5
## 2710                       Liriodendron tulipifera         Green    4.5
## 2712                                Liriope muscari         Green    5.0
## 2726                           Lobelia cardinalis         Green    5.8
## 2744                                Lolium perenne         Green    5.0
## 2745                  Lolium perenne ssp. multiflorum         Green    5.0
## 2754                           Lonicera japonica         Green    4.9
## 2755                            Lonicera maackii         Green    5.5
## 2757                         Lonicera sempervirens         Green    6.0
## 2759                             Lonicera tatarica         Green    5.2
## 2762                           Lotus corniculatus         Green    5.0
## 2768                           Ludwigia decurrens         Green    4.0
## 2774                           Ludwigia palustris    Gray-Green    5.0
## 2812                         Lycopodium annotinum         Green    4.0
## 2820                           Lycopus americanus         Green    5.2
## 2823                             Lycopus rubellus         Green    5.2
## 2827                           Lycopus virginicus    Dark Green    5.0
## 2838                         Lysimachia lanceolata         Green    5.0
## 2845                        Lysimachia thyrsiflora         Green    4.8
## 2855                              Maclura pomifera         Green    4.5
## 2859                           Magnolia acuminata         Green    5.2
## 2860                         Magnolia grandiflora         Green    4.5
## 2862                           Magnolia tripetala         Green    5.0
## 2863                          Magnolia virginiana    Dark Green    5.0
## 2906                    Maurandella antirrhiniflora         Green    6.8
```

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## 2916                          Medicago lupulina    Dark Green    5.5
## 2920                            Medicago sativa         Green    6.0
## 2923                         Medicago scutellata    Dark Green    5.9
## 2935                       Melilotus officinalis         Green    6.5
## 2949                             Mentha arvensis         Green    5.0
## 2956                       Menyanthes trifoliata         Green    4.8
## 2962                         Mertensia virginica         Green    4.5
## 2970                            Mikania scandens         Green    5.7
## 2978                             Mimulus alatus         Green    6.2
## 2990                       Miscanthus sinensis          Green    4.6
## 3008                          Monarda fistulosa    Gray-Green    6.0
## 3024                       Morella caroliniensis    Dark Green    4.5
## 3025                            Morella cerifera         Green    5.4
## 3026                        Morella pensylvanica         Green    5.5
## 3028                                 Morus alba          Green    5.0
## 3029                                Morus rubra          Green    5.0
## 3032                   Muhlenbergia asperifolia  Yellow-Green    6.0
## 3034                    Muhlenbergia capillaris  Yellow-Green    5.8
## 3035                      Muhlenbergia frondosa          Green    5.9
## 3037                     Muhlenbergia glomerata          Green    5.3
## 3038                      Muhlenbergia mexicana          Green    5.5
## 3039                     Muhlenbergia schreberi          Green    4.5
## 3041                     Muhlenbergia sylvatica          Green    5.9
## 3044                      Muhlenbergia uniflora          Green    4.8
## 3055                       Myosotis scorpioides          Green    5.5
## 3119                              Nyssa biflora          Green    4.5
## 3120                             Nyssa sylvatica         Green    4.5
## 3130                          Oenothera biennis          Green    5.0
## 3131                         Oenothera fruticosa         Green    4.5
## 3147              Oligoneuron rigidum var. rigidum          Green    5.0
## 3191                        Osmunda cinnamomea          Green    4.5
## 3194                        Osmunda claytoniana    Dark Green    4.0
## 3195                           Osmunda regalis     Dark Green    4.0
## 3196              Osmunda regalis var. spectabilis          Green    4.3
## 3198                         Ostrya virginiana          Green    4.2
## 3207                       Oxydendrum arboreum          Green    4.0
## 3212                    Pachysandra terminalis    Dark Green    5.5
## 3216                             Packera aurea          Green    4.5
## 3217                          Packera glabella          Green    4.0
## 3225                           Panicum amarum          Green    5.0
## 3230                    Panicum dichotomiflorum          Green    4.8
## 3235                          Panicum miliaceum          Green    5.8
## 3240                          Panicum rigidulum          Green    5.0
## 3246                           Panicum virgatum          Green    4.5
## 3278                Parthenocissus quinquefolia          Green    5.0
## 3279                Parthenocissus tricuspidata    Dark Green    5.0
## 3283                         Paspalum dilatatum          Green    4.9
## 3285                         Paspalum distichum          Green    4.9
## 3287                          Paspalum fluitans    Gray-Green    6.0
## 3288                             Paspalum laeve          Green    4.5
## 3296                          Passiflora lutea          Green    4.5
## 3302                        Paulownia tomentosa          Green    4.5
## 3306                     Pedicularis canadensis    Gray-Green    4.0
## 3314                        Peltandra virginica          Green    5.0
```

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## 3316                          Pennisetum glaucum         Green    5.5
## 3320                         Penstemon digitalis           Red    5.5
## 3325                          Penthorum sedoides         Green    5.0
## 3330                            Persea palustris         Green    5.0
## 3344                        Phalaris arundinacea         Green    5.5
## 3357                     Philadelphus coronarius         Green    5.3
## 3363                           Phleum pratense         Green    5.0
## 3368                         Phlox divaricata          Green    5.5
## 3373                         Phlox glaberrima          Green    5.8
## 3377                Phlox maculata ssp. maculata       Green    5.9
## 3383                          Phlox subulata           Green    5.7
## 3393                        Photinia pyrifolia         Green    5.5
## 3395                       Phragmites australis        Green    4.5
## 3402                           Phyla nodiflora         Green    6.0
## 3407                       Phyllostachys aurea         Green    5.0
## 3423                    Physocarpus opulifolius        Green    4.5
## 3430                       Phytolacca americana        Green    4.7
## 3435                              Picea abies    Dark Green    5.0
## 3436                            Picea glauca          Green    4.0
## 3437                           Picea pungens          Green    5.5
## 3438                            Picea rubens          Green    4.0
## 3453                          Pinus echinata          Green    4.0
## 3454                           Pinus pungens          Green    4.5
## 3455                          Pinus resinosa  Yellow-Green    4.5
## 3456                            Pinus rigida  Yellow-Green    3.5
## 3457                          Pinus serotina          Green    4.8
## 3458                           Pinus strobus    Dark Green    4.0
## 3459                         Pinus sylvestris          Green    5.0
## 3460                              Pinus taeda          Green    4.0
## 3461                         Pinus virginiana          Green    4.5
## 3471                      Pityopsis graminifolia       Green    5.8
## 3478                             Plantago major        Green    4.8
## 3503                     Platanus occidentalis         Green    4.9
## 3513          Pluchea odorata var. odorata             Green    4.5
## 3517                               Poa annua           Green    4.8
## 3518                          Poa autumnalis           Green    5.8
## 3519                             Poa bulbosa           Green    5.0
## 3521                           Poa compressa           Green    5.0
## 3525                           Poa palustris           Green    4.9
## 3526                           Poa pratensis           Green    5.0
## 3529                          Poa sylvestris           Green    5.9
## 3530                           Poa trivialis           Green    4.8
## 3575                       Polygonum amphibium         Green    4.0
## 3596                      Polygonum hydropiper         Green    5.0
## 3597                 Polygonum hydropiperoides      Dark Green    4.5
## 3600                   Polygonum pensylvanicum         Green    4.0
## 3602                      Polygonum persicaria         Green    4.0
## 3603                       Polygonum punctatum         Green    6.0
## 3611                      Polygonum sagittatum         Green    4.0
## 3625                   Polypogon monspeliensis         Green    4.8
## 3634                        Pontederia cordata         Green    4.9
## 3636                              Populus alba         Green    4.9
## 3637                         Populus balsamifera  Yellow-Green    4.5
## 3641                           Populus deltoides         Green    4.6
```

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## 3643                    Populus grandidentata        Green    4.8
## 3644                     Populus heterophylla        Green    4.6
## 3646                            Populus nigra        Green    5.0
## 3647                      Populus tremuloides        Green    4.3
## 3652                  Potamogeton amplifolius        Green    5.5
## 3653                     Potamogeton crispus          Red    6.4
## 3654                Potamogeton diversifolius        Green    5.0
## 3655                   Potamogeton epihydrus        Green    5.4
## 3658                   Potamogeton gramineus        Green    5.5
## 3661                      Potamogeton natans        Green    5.8
## 3662                     Potamogeton nodosus        Green    5.8
## 3665                  Potamogeton praelongus        Green    5.8
## 3671                   Potamogeton robbinsii        Green    5.8
## 3673                Potamogeton zosteriformis        Green    5.8
## 3677                     Potentilla arguta        Green    6.0
## 3708                      Prunella vulgaris   Gray-Green    5.4
## 3713                      Prunus americana        Green    5.0
## 3714                    Prunus angustifolia        Green    5.0
## 3723                       Prunus maritima        Green    5.8
## 3725                    Prunus pensylvanica        Green    4.3
## 3729                       Prunus serotina        Green    4.0
## 3733                     Prunus tomentosa        Green    5.7
## 3734                     Prunus virginiana        Green    5.2
## 3748                     Ptelea trifoliata        Green    4.8
## 3752                   Pteridium aquilinum   Dark Green    4.5
## 3792                        Pyrus communis        Green    5.2
## 3796                         Quercus alba        Green    4.5
## 3797                       Quercus bicolor        Green    4.3
## 3800                      Quercus coccinea        Green    4.5
## 3802                       Quercus falcata        Green    4.8
## 3806                     Quercus imbricaria   Dark Green    4.5
## 3808                     Quercus laurifolia        Green    4.2
## 3810                        Quercus lyrata        Green    4.5
## 3811                     Quercus macrocarpa        Green    4.5
## 3813                     Quercus marilandica   Dark Green    4.6
## 3815                      Quercus michauxii        Green    4.5
## 3817                   Quercus muehlenbergii        Green    5.0
## 3818                         Quercus nigra        Green    4.8
## 3819                        Quercus pagoda        Green    4.5
## 3820                     Quercus palustris        Green    4.5
## 3821                       Quercus phellos        Green    4.5
## 3824                         Quercus rubra        Green    4.3
## 3829                      Quercus shumardii        Green    5.0
## 3832                       Quercus stellata        Green    4.8
## 3834                       Quercus velutina        Green    4.5
## 3836                   Ranunculus abortivus        Green    5.0
## 3848                     Ranunculus hispidus   Gray-Green    4.5
## 3851                   Ranunculus laxicaulis        Green    6.0
## 3854                Ranunculus pensylvanicus        Green    5.0
## 3859                      Ranunculus repens        Green    5.6
## 3861                   Ranunculus sceleratus        Green    4.8
## 3872                       Rhamnus alnifolia        Green    4.0
## 3887                Rhododendron arborescens   Dark Green    4.2
## 3888                 Rhododendron atlanticum   Dark Green    4.2
```

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## 3890                      Rhododendron canescens         Green    4.3
## 3891                       Rhododendron maximum    Dark Green    4.0
## 3892                 Rhododendron periclymenoides         Green    4.3
## 3894                      Rhododendron viscosum         Green    4.0
## 3898                           Rhus copallinum         Green    5.3
## 3900                              Rhus glabra         Green    5.3
## 3901                           Rhus trilobata         Green    6.5
## 3912                  Rhynchospora corniculata  Yellow-Green    5.1
## 3931                            Ribes aureum         Green    6.0
## 3951                      Robinia pseudoacacia         Green    4.6
## 3959                      Rorippa sessiliflora         Green    5.5
## 3960                           Rorippa sinuata         Green    5.0
## 3961                         Rorippa sylvestris         Green    5.0
## 3967                            Rosa carolina         Green    4.0
## 3971                           Rosa palustris         Green    4.0
## 3973                              Rosa rugosa         Green    5.5
## 3974                            Rosa setigera    Dark Green    5.0
## 3976                          Rosa virginiana         Green    5.0
## 3984                      Rubus allegheniensis         Green    4.6
## 3987                             Rubus alumnus         Green    4.8
## 3989                           Rubus argutus         Green    4.5
## 3990                         Rubus baileyanus         Green    5.0
## 3994                        Rubus cuneifolius         Green    5.0
## 4002                           Rubus hispidus    Gray-Green    4.5
## 4003                            Rubus idaeus         Green    5.0
## 4006                         Rubus laciniatus         Green    5.2
## 4016                        Rubus occidentalis         Green    5.2
## 4017                            Rubus odoratus         Green    4.5
## 4043                         Rudbeckia hirta         Green    6.0
## 4046                       Rudbeckia laciniata    Gray-Green    4.5
## 4056                          Ruellia humilis         Green    4.5
## 4058                         Ruellia strepens         Green    6.0
## 4065                          Rumex maritimus         Green    5.0
## 4085                      Saccharum brevibarbe         Green    4.0
## 4089                       Saccharum giganteum         Green    3.5
## 4090                        Saccharum ravennae         Green    4.8
## 4092                       Sacciolepis striata         Green    5.0
## 4110                      Sagittaria latifolia         Green    4.7
## 4118                                Salix alba         Green    4.5
## 4123                         Salix caroliniana         Green    4.5
## 4126                            Salix discolor         Green    4.0
## 4128                         Salix eriocephala         Green    4.0
## 4130                            Salix humilis    Dark Green    5.9
## 4133                          Salix interior         Green    4.0
## 4134                            Salix lucida  Yellow-Green    5.8
## 4136                             Salix nigra         Green    4.8
## 4138                          Salix pentandra    Dark Green    6.5
## 4141                        Salix ×sepulcralis         Green    4.5
## 4142                            Salix sericea         Green    5.2
## 4159          Sambucus nigra ssp. canadensis          Green    5.0
## 4161        Sambucus racemosa var. racemosa          Green    5.2
## 4181                 Saponaria officinalis          Green    5.0
## 4186                     Sassafras albidum          Green    4.5
## 4204                Schizachyrium scoparium    Gray-Green    5.0
```

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## 4216                    Schoenoplectus fluviatilis         Green    4.0
## 4219          Schoenoplectus pungens var. pungens    Dark Green    3.7
## 4220                      Schoenoplectus robustus         Green    6.4
## 4222                Schoenoplectus tabernaemontani         Green    5.4
## 4228                             Scirpus atrovirens    Dark Green    4.0
## 4229                              Scirpus cyperinus         Green    4.8
## 4231                             Scirpus georgianus    Dark Green    4.5
## 4233                               Scirpus pendulus         Green    4.9
## 4274                                 Secale cereale         Green    4.5
## 4288                               Senecio vulgaris         Green    5.0
## 4293                              Senna marilandica         Green    4.0
## 4308                                Setaria italica         Green    5.3
## 4311                                 Setaria pumila         Green    5.0
## 4331                           Sideroxylon lycioides         Green    4.0
## 4355                            Silphium perfoliatum         Green    4.5
## 4373                    Sisyrinchium angustifolium         Green    5.0
## 4382                                Smilax bona-nox         Green    4.5
## 4385                                  Smilax glauca    Gray-Green    4.5
## 4387                              Smilax laurifolia         Green    4.0
## 4390                             Smilax rotundifolia         Green    5.0
## 4392                                  Smilax walteri         Green    4.0
## 4401       Solanum lycopersicum var. lycopersicum         Green    5.5
## 4416                                 Solidago caesia    Dark Green    5.5
## 4417                             Solidago canadensis         Green    4.8
## 4422                              Solidago fistulosa    Dark Green    4.5
## 4423                            Solidago flexicaulis         Green    5.3
## 4424                               Solidago gigantea         Green    4.0
## 4429                          Solidago missouriensis         Green    5.5
## 4431                              Solidago nemoralis         Green    6.5
## 4435                                 Solidago patula         Green    4.5
## 4441                                 Solidago rugosa         Green    5.0
## 4447                           Solidago sempervirens    Dark Green    5.5
## 4458             Solidago uliginosa var. uliginosa         Green    4.5
## 4468                               Sorbus americana         Green    5.3
## 4469                               Sorbus aucuparia         Green    5.5
## 4472                            Sorghastrum nutans         Green    4.8
## 4474                               Sorghum bicolor         Green    5.5
## 4475                  Sorghum bicolor ssp. bicolor         Green    5.5
## 4476                               Sorghum halepense         Green    5.0
## 4478                         Sparganium americanum         Green    4.9
## 4481                         Sparganium eurycarpum         Green    5.0
## 4483                         Spartina alterniflora         Green    5.4
## 4485                         Spartina cynosuroides         Green    5.8
## 4486                               Spartina patens         Green    5.5
## 4487                            Spartina pectinata         Green    6.0
## 4505                         Sphenopholis obtusata         Green    5.0
## 4510                                 Spiraea alba         Green    4.3
## 4513                           Spiraea betulifolia         Green    6.0
## 4520                              Spiraea tomentosa         Green    4.5
## 4523                              Spiranthes cernua         Green    4.5
## 4537                           Spirodela polyrrhiza         Green    5.0
## 4541        Sporobolus compositus var. compositus         Green    5.5
## 4542                        Sporobolus heterolepis         Green    6.0
## 4549                         Sporobolus virginicus         Green    6.0
```

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## 4557                             Stachys palustris    Dark Green    5.7
## 4558                            Stachys tenuifolia         Green    5.7
## 4566                          Stellaria longifolia    Dark Green    4.0
## 4568                            Stellaria longipes         Green    4.8
## 4600                         Symphoricarpos albus          Green    6.0
## 4603                  Symphoricarpos occidentalis          Green    6.6
## 4604                   Symphoricarpos orbiculatus          Green    5.5
## 4608                   Symphyotrichum cordifolium    Gray-Green    5.7
## 4620               Symphyotrichum laeve var. laeve          Green    5.8
## 4627 Symphyotrichum lateriflorum var. lateriflorum          Green    5.2
## 4632  Symphyotrichum novi-belgii var. novi-belgii           Green    5.5
## 4636             Symphyotrichum patens var. patens    Dark Green    4.9
## 4639          Symphyotrichum pilosum var. pilosum          Green    5.4
## 4643                 Symphyotrichum prenanthoides          Green    5.5
## 4645        Symphyotrichum puniceum var. puniceum          Green    4.5
## 4648                    Symphyotrichum subulatum          Green    5.6
## 4656                       Symplocarpus foetidus          Green    4.0
## 4658                         Symplocos tinctoria  Yellow-Green    4.5
## 4661                            Syringa vulgaris          Green    5.8
## 4675                         Taraxacum officinale          Green    4.8
## 4678                           Taxodium distichum          Green    4.5
## 4680                            Taxus canadensis          Green    5.3
## 4688                           Teucrium canadense    White-Gray    4.5
## 4703                 Thelypteris noveboracensis  Yellow-Green    4.0
## 4715                           Thuja occidentalis          Green    5.2
## 4725                              Tilia americana          Green    4.5
## 4727            Tilia americana var. heterophylla          Green    5.0
## 4728                               Tilia cordata          Green    4.8
## 4730                        Tillandsia usneoides    White-Gray    6.0
## 4756                     Tradescantia virginiana          Green    4.0
## 4758                          Tragopogon dubius          Green    6.5
## 4760                       Tragopogon porrifolius          Green    5.2
## 4789                             Tridens flavus          Green    4.5
## 4799                          Trifolium hybridum          Green    5.6
## 4800                        Trifolium incarnatum          Green    5.5
## 4802                          Trifolium pratense          Green    5.5
## 4804                           Trifolium repens          Green    5.2
## 4840                       Tripsacum dactyloides          Green    5.1
## 4842                           Triticum aestivum          Green    5.5
## 4844                            Tsuga canadensis    Dark Green    4.2
## 4850                          Typha angustifolia          Green    3.7
## 4853                             Typha latifolia          Green    5.5
## 4855                                 Ulmus alata          Green    5.0
## 4856                              Ulmus americana          Green    5.0
## 4857                             Ulmus parvifolia          Green    4.8
## 4859                                 Ulmus pumila          Green    5.5
## 4860                                  Ulmus rubra          Green    5.0
## 4861                               Ulmus thomasii          Green    4.5
## 4863                            Uniola paniculata          Green    6.0
## 4866                              Urochloa mutica          Green    5.3
## 4869                          Urochloa platyphylla          Green    5.0
## 4870                               Urochloa ramosa          Green    5.5
## 4902                        Vaccinium angustifolium          Green    4.7
## 4904                           Vaccinium corymbosum          Green    4.7
```

```
## 4912                          Vaccinium stamineum         Green    4.0
## 4949                        Verbesina encelioides         Green    6.4
## 4958                      Vernonia noveboracensis    Dark Green    4.5
## 4961                          Veronica americana         Green    5.7
## 4984                        Viburnum acerifolium         Green    4.8
## 4986                Viburnum dentatum var. dentatum  Yellow-Green    4.5
## 4989                           Viburnum lantana         Green    5.5
## 4990                        Viburnum lantanoides         Green    4.9
## 4991                           Viburnum lentago         Green    5.0
## 4994                Viburnum nudum var. cassinoides         Green    4.9
## 4996                           Viburnum opulus         Green    5.2
## 4998                        Viburnum prunifolium         Green    4.8
## 4999                      Viburnum rafinesqueanum         Green    4.5
## 5003                           Vicia americana         Green    5.9
## 5006                              Vicia cracca         Green    4.9
## 5009                         Vicia grandiflora    Dark Green    6.0
## 5016                             Vicia villosa         Green    6.0
## 5021                         Vigna unguiculata         Green    6.0
## 5024                               Vinca minor    Dark Green    5.5
## 5048                          Viola macloskeyi         Green    6.0
## 5056                           Viola pubescens    Dark Green    6.0
## 5066                             Viola sororia         Green    6.0
## 5079                          Vitis aestivalis         Green    5.3
## 5082                             Vitis cinerea    Dark Green    5.4
## 5086                             Vitis riparia         Green    6.1
## 5087                         Vitis rotundifolia         Green    6.0
## 5090                             Vitis vulpina         Green    6.0
## 5104                        Wisteria frutescens         Green    4.0
## 5145                                  Zea mays    Dark Green    5.5
## 5153                          Zizania aquatica         Green    6.4
## 5158                       Zizaniopsis miliacea         Green    4.3
##      pH_Max PH_Mean
## 4       6.0    5.00
## 9       8.5    7.75
## 14      7.0    6.45
## 17      7.8    6.40
## 19      7.3    5.90
## 20      6.5    5.45
## 21      7.2    6.00
## 22      7.0    6.40
## 23      7.3    6.00
## 26      7.3    5.65
## 27      7.9    5.80
## 29      7.0    5.90
## 31      8.0    7.00
## 32      8.0    7.00
## 43      7.2    6.20
## 51      8.0    7.00
## 52      6.6    5.60
## 63      7.0    6.00
## 90      7.0    5.75
## 92      8.0    7.00
## 94      7.0    5.75
## 95      7.5    6.50
```

```
## 99      7.5    6.25
## 100     7.5    6.20
## 102     8.0    6.25
## 103     7.5    6.25
## 104     7.5    6.50
## 105     8.0    7.00
## 106     7.5    6.30
## 108     7.9    6.00
## 117     7.5    6.50
## 121     7.3    6.05
## 128     7.0    6.00
## 146     7.0    6.00
## 147     7.7    6.25
## 148     7.0    6.00
## 149     7.0    6.00
## 151     8.0    6.75
## 153     7.5    5.75
## 154     7.5    5.75
## 156     7.5    5.75
## 157     8.0    6.90
## 187     7.5    6.15
## 189     7.5    6.50
## 192     7.0    5.90
## 194     7.0    6.00
## 195     7.2    5.85
## 201     5.9    4.95
## 204     8.5    7.25
## 205     7.8    6.80
## 207     8.5    6.75
## 209     8.0    6.00
## 211     7.4    6.30
## 226     7.5    6.75
## 231     7.5    6.75
## 233     6.3    5.65
## 238     7.5    5.75
## 240     7.0    5.95
## 258     7.5    6.50
## 279     7.5    6.75
## 286     7.0    5.75
## 307     7.2    6.10
## 310     6.6    5.70
## 316     8.0    6.75
## 326     8.0    7.50
## 329     7.0    5.90
## 359     7.0    6.00
## 368     9.0    7.50
## 381     6.9    5.95
## 384     7.0    5.90
## 390     8.0    6.50
## 400     6.8    5.80
## 406     7.2    5.95
## 438     8.0    7.00
## 444     7.0    5.75
## 466     7.5    6.75
```

```
## 467     8.5    6.90
## 473     7.8    6.65
## 479     7.8    6.60
## 488     7.0    6.40
## 504     7.2    6.35
## 511     8.0    6.00
## 514     6.8    5.20
## 515     6.5    4.75
## 516     7.4    5.80
## 518     6.5    5.00
## 522     7.0    6.00
## 526     7.0    6.05
## 527     7.1    6.15
## 528     7.1    6.15
## 529     7.1    6.10
## 530     7.2    6.20
## 531     7.0    6.00
## 532     8.6    6.80
## 535     7.2    6.10
## 546     7.0    6.05
## 552     7.0    6.15
## 557     7.5    6.80
## 559     7.5    6.25
## 564     6.0    5.20
## 570     6.9    6.25
## 575     8.5    7.00
## 577     7.2    6.60
## 586     7.2    6.60
## 587     7.2    6.60
## 590     8.0    6.50
## 599     7.5    6.35
## 600     7.2    6.25
## 601     8.0    6.75
## 602     7.5    6.50
## 607     8.0    6.75
## 608     8.0    6.75
## 611     7.0    6.35
## 617     8.2    7.10
## 639     9.2    7.45
## 642     8.3    6.65
## 650     8.0    6.25
## 652     7.0    5.50
## 664     7.0    5.90
## 671     6.8    6.00
## 678     6.8    5.85
## 694     6.5    5.35
## 700     7.5    6.75
## 705     7.5    6.50
## 707     6.8    5.85
## 718     8.5    6.75
## 721     6.8    5.90
## 724     7.7    6.85
## 730     6.8    5.80
## 741     6.8    5.80
```

```
## 750     7.8    6.05
## 752     7.0    6.45
## 755     7.5    5.75
## 760     6.0    5.25
## 764     7.0    5.90
## 766     7.0    5.70
## 773     7.5    6.65
## 775     7.2    6.15
## 782     7.0    5.90
## 786     7.5    6.05
## 791     7.5    5.75
## 794     6.8    5.85
## 796     6.6    5.60
## 801     6.6    5.55
## 802     7.2    6.10
## 812     7.2    6.40
## 820     7.1    5.85
## 822     7.2    6.55
## 824     8.0    6.00
## 827     6.9    5.80
## 828     7.2    6.60
## 832     7.2    6.45
## 841     7.9    6.75
## 843     7.2    6.30
## 844     6.9    5.85
## 846     7.3    6.00
## 849     6.8    6.20
## 859     6.9    5.85
## 862     6.8    5.90
## 869     7.0    6.60
## 870     6.8    5.85
## 875     7.0    5.95
## 881     6.7    5.70
## 892     6.8    5.80
## 893     6.8    5.80
## 894     7.0    5.90
## 902     6.8    5.75
## 903     6.9    5.75
## 906     6.9    5.80
## 909     6.8    5.90
## 911     7.3    6.45
## 912     7.9    6.40
## 915     6.9    5.80
## 920     7.0    5.25
## 923     7.0    5.95
## 929     7.0    6.00
## 930     7.0    5.90
## 933     7.0    6.35
## 934     6.8    5.65
## 937     7.0    6.35
## 939     7.7    6.70
## 943     7.5    6.00
## 946     7.5    6.00
## 947     8.9    7.85
```

```
## 952     7.4    5.70
## 958     7.4    6.10
## 959     7.3    6.05
## 960     7.5    6.00
## 961     6.6    5.80
## 963     7.3    5.65
## 967     6.5    6.00
## 972     6.8    5.85
## 974     7.5    6.50
## 976     7.0    6.25
## 978     7.0    5.75
## 980     6.5    5.40
## 982     7.5    6.25
## 983     7.5    6.25
## 987     7.7    6.05
## 989     7.8    6.90
## 1017    8.6    6.65
## 1031    8.6    7.30
## 1034    7.9    6.45
## 1037    8.0    6.25
## 1049    7.5    6.50
## 1056    6.3    4.90
## 1058    6.0    5.50
## 1075    7.0    6.00
## 1076    7.0    5.75
## 1104    8.5    7.25
## 1112    7.4    6.40
## 1115    6.5    5.50
## 1133    7.5    6.75
## 1139    8.5    6.25
## 1140    7.0    5.85
## 1142    6.6    5.80
## 1178    6.8    5.90
## 1187    7.0    5.75
## 1191    6.8    5.90
## 1198    7.0    6.00
## 1212    7.2    6.20
## 1216    6.7    5.70
## 1218    7.0    5.50
## 1222    7.5    6.50
## 1231    7.5    6.50
## 1235    7.2    6.00
## 1250    7.0    6.50
## 1252    7.8    6.50
## 1259    7.3    6.05
## 1260    7.0    6.00
## 1261    6.9    6.20
## 1262    7.7    6.25
## 1263    7.2    6.50
## 1265    7.4    6.10
## 1266    7.8    7.10
## 1268    7.5    6.15
## 1275    6.8    5.80
## 1278    7.0    6.00
```

```
## 1279    7.5    6.15
## 1292    7.2    5.85
## 1304    7.0    5.65
## 1309    7.3    5.80
## 1360    6.5    5.75
## 1371    8.0    6.50
## 1380    6.8    5.85
## 1381    6.5    5.50
## 1382    6.5    5.75
## 1388    6.5    5.75
## 1389    7.0    6.00
## 1393    7.0    6.00
## 1400    7.0    6.00
## 1404    8.3    6.65
## 1406    6.5    5.50
## 1408    6.8    5.70
## 1415    7.0    6.70
## 1429    7.0    6.25
## 1432    7.5    6.25
## 1446    7.0    5.90
## 1459    8.6    6.75
## 1469    6.8    5.80
## 1476    8.0    6.50
## 1495    7.0    6.50
## 1498    7.0    6.30
## 1520    6.5    5.25
## 1527    7.5    5.75
## 1528    6.5    5.25
## 1534    6.5    5.25
## 1543    6.5    5.25
## 1550    7.0    5.50
## 1551    7.5    6.00
## 1563    7.0    5.90
## 1567    7.0    6.25
## 1590    7.5    6.10
## 1602   10.0    8.20
## 1604    7.5    6.00
## 1629    6.5    5.00
## 1642    7.5    6.10
## 1652    7.2    6.85
## 1653    7.2    6.85
## 1655    8.5    6.25
## 1659    7.4    6.05
## 1663    9.4    6.60
## 1674    7.9    6.55
## 1678    9.5    7.75
## 1679    7.9    6.45
## 1681    7.5    6.25
## 1703    8.7    6.40
## 1707    8.0    6.00
## 1713    7.0    6.60
## 1721    7.2    6.10
## 1729    7.8    6.30
## 1732    7.9    6.45
```

```
## 1738    7.8    6.50
## 1739    7.2    5.85
## 1742    9.0    7.30
## 1744    7.0    6.00
## 1756    7.5    6.00
## 1758    6.5    5.25
## 1763    7.0    5.50
## 1765    6.0    5.25
## 1769    6.5    5.25
## 1774    8.5    6.50
## 1778    8.5    6.50
## 1787    7.5    5.75
## 1797    7.8    6.30
## 1802    7.2    6.00
## 1807    7.6    5.80
## 1816    6.5    5.25
## 1818    6.5    5.15
## 1835    8.5    7.25
## 1903    6.9    5.90
## 1923    7.2    5.65
## 1931    7.5    6.25
## 1933    7.2    6.35
## 1959    7.5    6.25
## 1970    7.5    6.10
## 1971    8.2    6.30
## 1972    8.1    6.40
## 1973    7.3    5.90
## 2000    7.2    6.30
## 2001    7.0    6.00
## 2002    7.2    6.10
## 2011    7.0    5.80
## 2019    7.0    5.80
## 2021    8.0    6.30
## 2030    6.5    5.25
## 2031    6.5    5.25
## 2036    6.5    5.50
## 2038    6.5    5.40
## 2039    5.5    4.65
## 2044    7.2    6.50
## 2048    7.2    6.50
## 2074    7.5    6.00
## 2076    7.0    6.00
## 2079    7.0    5.90
## 2080    7.0    5.90
## 2091    8.8    7.65
## 2097    8.0    6.40
## 2102    8.5    6.75
## 2107    8.0    6.25
## 2108    7.0    5.50
## 2110    8.0    6.00
## 2112    7.8    6.65
## 2159    6.2    5.35
## 2166    7.8    6.50
## 2170    7.5    5.75
```

```
## 2172    7.5    6.00
## 2178    7.0    5.50
## 2179    7.8    6.65
## 2180    7.2    6.20
## 2185    7.3    6.55
## 2200    7.0    5.50
## 2205    8.5    7.50
## 2223    7.3    6.35
## 2232    7.0    6.00
## 2254    7.2    6.35
## 2255    7.5    5.75
## 2275    7.0    5.50
## 2282    8.5    7.25
## 2289    8.0    7.10
## 2290    8.5    6.75
## 2305    6.9    6.20
## 2333    8.3    7.00
## 2349    7.1    6.40
## 2351    7.0    5.80
## 2352    7.5    5.75
## 2353    6.4    5.60
## 2357    7.0    5.80
## 2362    7.2    5.90
## 2364    7.2    5.90
## 2365    7.0    5.80
## 2370    7.3    6.25
## 2372    6.5    5.00
## 2373    7.0    5.75
## 2377    7.0    5.75
## 2379    7.5    6.00
## 2381    7.4    6.90
## 2382    7.4    7.10
## 2410    7.3    6.05
## 2426    7.5    5.75
## 2428    5.7    5.35
## 2439    7.0    6.50
## 2440    8.2    6.40
## 2442    7.2    5.80
## 2446    7.5    6.15
## 2447    7.0    5.75
## 2448    6.7    5.60
## 2449    7.1    6.50
## 2451    7.6    6.10
## 2454    5.9    5.20
## 2458    6.5    5.50
## 2461    8.8    7.15
## 2471    6.8    6.15
## 2472    6.8    5.65
## 2476    7.0    6.25
## 2477    7.0    5.50
## 2478    6.8    6.20
## 2479    6.8    5.85
## 2480    6.0    5.25
## 2482    7.0    5.75
```

```
## 2483    6.5    5.50
## 2485    6.8    5.90
## 2488    8.0    6.75
## 2490    8.0    6.35
## 2493    7.6    6.50
## 2498    5.5    5.00
## 2506    8.0    7.00
## 2508    8.0    6.25
## 2517    7.5    6.50
## 2518    7.3    6.10
## 2524    7.8    6.15
## 2526    7.4    5.70
## 2539    7.5    6.25
## 2554    7.0    6.50
## 2555    6.5    6.00
## 2558    6.2    6.00
## 2578    8.0    6.50
## 2579    8.8    6.95
## 2580    8.5    6.50
## 2610    8.0    7.00
## 2612    7.5    5.75
## 2617    8.2    6.95
## 2620    6.9    6.35
## 2631    7.0    6.10
## 2641    7.5    6.55
## 2652    7.5    6.65
## 2653    6.9    6.20
## 2656    7.7    6.80
## 2659    7.5    6.25
## 2671    5.9    5.45
## 2673    8.5    7.25
## 2681    6.0    5.25
## 2697    8.0    6.50
## 2708    7.0    5.75
## 2710    6.5    5.50
## 2712    8.0    6.50
## 2726    7.8    6.80
## 2744    8.0    6.50
## 2745    7.9    6.45
## 2754    7.8    6.35
## 2755    8.0    6.75
## 2757    8.5    7.25
## 2759    7.5    6.35
## 2762    8.0    6.50
## 2768    6.0    5.00
## 2774    8.5    6.75
## 2812    5.3    4.65
## 2820    7.8    6.50
## 2823    7.2    6.20
## 2827    6.3    5.65
## 2838    7.0    6.00
## 2845    7.2    6.00
## 2855    7.5    6.00
## 2859    7.0    6.10
```

```
## 2860    6.5    5.50
## 2862    7.5    6.25
## 2863    6.9    5.95
## 2906    9.0    7.90
## 2916    8.0    6.75
## 2920    8.5    7.25
## 2923    7.5    6.70
## 2935    8.2    7.35
## 2949    7.0    6.00
## 2956    6.5    5.65
## 2962    8.0    6.25
## 2970    8.7    7.20
## 2978    7.8    7.00
## 2990    7.5    6.05
## 3008    8.0    7.00
## 3024    7.0    5.75
## 3025    9.1    7.25
## 3026    7.8    6.65
## 3028    7.0    6.00
## 3029    7.0    6.00
## 3032    8.4    7.20
## 3034    6.8    6.30
## 3035    7.9    6.90
## 3037    7.5    6.40
## 3038    7.5    6.50
## 3039    7.5    6.00
## 3041    7.5    6.70
## 3044    6.8    5.80
## 3055    7.5    6.50
## 3119    5.7    5.10
## 3120    6.0    5.25
## 3130    7.0    6.00
## 3131    7.0    5.75
## 3147    7.5    6.25
## 3191    7.0    5.75
## 3194    6.0    5.00
## 3195    6.0    5.00
## 3196    5.2    4.75
## 3198    7.6    5.90
## 3207    6.5    5.25
## 3212    7.5    6.50
## 3216    8.5    6.50
## 3217    7.5    5.75
## 3225    7.5    6.25
## 3230    7.0    5.90
## 3235    6.8    6.30
## 3240    7.5    6.25
## 3246    8.0    6.25
## 3278    7.5    6.25
## 3279    6.5    5.75
## 3283    6.5    5.70
## 3285    8.9    6.90
## 3287    8.6    7.30
## 3288    7.5    6.00
```

```
## 3296    8.0    6.25
## 3302    7.5    6.00
## 3306    7.0    5.50
## 3314    8.8    6.90
## 3316    6.8    6.15
## 3320    7.0    6.25
## 3325    7.0    6.00
## 3330    7.0    6.00
## 3344    8.0    6.75
## 3357    7.5    6.40
## 3363    7.8    6.40
## 3368    7.2    6.35
## 3373    7.0    6.40
## 3377    6.8    6.35
## 3383    7.5    6.60
## 3393    7.5    6.50
## 3395    8.7    6.60
## 3402    8.5    7.25
## 3407    7.5    6.25
## 3423    6.5    5.50
## 3430    8.0    6.35
## 3435    7.0    6.00
## 3436    8.2    6.10
## 3437    7.8    6.65
## 3438    5.8    4.90
## 3453    6.0    5.00
## 3454    7.0    5.75
## 3455    6.0    5.25
## 3456    5.1    4.30
## 3457    6.8    5.80
## 3458    6.5    5.25
## 3459    7.5    6.25
## 3460    7.0    5.50
## 3461    7.5    6.00
## 3471    7.0    6.40
## 3478    7.3    6.05
## 3503    6.5    5.70
## 3513    7.0    5.75
## 3517    8.0    6.40
## 3518    6.9    6.35
## 3519    7.2    6.10
## 3521    7.0    6.00
## 3525    7.5    6.20
## 3526    8.4    6.70
## 3529    7.0    6.45
## 3530    7.5    6.15
## 3575    7.0    5.50
## 3596    7.5    6.25
## 3597    8.8    6.65
## 3600    8.5    6.25
## 3602    8.5    6.25
## 3603    8.7    7.35
## 3611    8.5    6.25
## 3625    7.8    6.30
```

```
## 3634    8.7    6.80
## 3636    7.0    5.95
## 3637    7.0    5.75
## 3641    6.5    5.55
## 3643    7.2    6.00
## 3644    5.9    5.25
## 3646    8.5    6.75
## 3647    9.0    6.65
## 3652    7.0    6.25
## 3653    8.5    7.45
## 3654    7.7    6.35
## 3655    7.0    6.20
## 3658    7.0    6.25
## 3661    7.0    6.40
## 3662    7.0    6.40
## 3665    7.0    6.40
## 3671    7.0    6.40
## 3673    7.0    6.40
## 3677    8.0    7.00
## 3708    8.0    6.70
## 3713    7.0    6.00
## 3714    7.5    6.25
## 3723    7.7    6.75
## 3725    7.3    5.80
## 3729    7.5    5.75
## 3733    7.2    6.45
## 3734    8.4    6.80
## 3748    7.0    5.90
## 3752    7.0    5.75
## 3792    6.7    5.95
## 3796    6.8    5.65
## 3797    6.5    5.40
## 3800    6.9    5.70
## 3802    7.0    5.90
## 3806    6.0    5.25
## 3808    6.5    5.35
## 3810    7.5    6.00
## 3811    7.5    6.00
## 3813    5.6    5.10
## 3815    6.5    5.50
## 3817    8.0    6.50
## 3818    7.3    6.05
## 3819    6.0    5.25
## 3820    6.5    5.50
## 3821    6.5    5.50
## 3824    7.3    5.80
## 3829    7.6    6.30
## 3832    6.5    5.65
## 3834    6.5    5.50
## 3836    7.5    6.25
## 3848    8.0    6.25
## 3851    7.5    6.75
## 3854    7.5    6.25
## 3859    7.2    6.40
```

```
## 3861    8.4    6.60
## 3872    8.0    6.00
## 3887    5.7    4.95
## 3888    5.7    4.95
## 3890    5.8    5.05
## 3891    5.5    4.75
## 3892    5.5    4.90
## 3894    7.0    5.50
## 3898    7.5    6.40
## 3900    7.5    6.40
## 3901    8.2    7.35
## 3912    7.4    6.25
## 3931    8.0    7.00
## 3951    8.2    6.40
## 3959    7.5    6.50
## 3960    8.5    6.75
## 3961    8.0    6.50
## 3967    7.0    5.50
## 3971    7.0    5.50
## 3973    7.5    6.50
## 3974    7.5    6.25
## 3976    7.0    6.00
## 3984    7.5    6.05
## 3987    7.0    5.90
## 3989    7.0    5.75
## 3990    7.0    6.00
## 3994    7.0    6.00
## 4002    7.0    5.75
## 4003    7.5    6.25
## 4006    7.7    6.45
## 4016    7.5    6.35
## 4017    6.5    5.50
## 4043    7.0    6.50
## 4046    7.0    5.75
## 4056    7.5    6.00
## 4058    8.5    7.25
## 4065    8.2    6.60
## 4085    7.5    5.75
## 4089    7.0    5.25
## 4090    7.0    5.90
## 4092    7.3    6.15
## 4110    8.9    6.80
## 4118    7.8    6.15
## 4123    8.8    6.65
## 4126    7.0    5.50
## 4128    7.0    5.50
## 4130    7.0    6.45
## 4133    7.8    5.90
## 4134    7.2    6.50
## 4136    8.0    6.40
## 4138    7.5    7.00
## 4141    7.5    6.00
## 4142    7.0    6.10
## 4159    8.9    6.95
```

```
## 4161    7.2    6.20
## 4181    7.0    6.00
## 4186    7.3    5.90
## 4204    8.4    6.70
## 4216    7.5    5.75
## 4219    7.5    5.60
## 4220    8.4    7.40
## 4222    7.5    6.45
## 4228    8.0    6.00
## 4229    7.2    6.00
## 4231    7.0    5.75
## 4233    7.0    5.95
## 4274    8.2    6.35
## 4288    8.5    6.75
## 4293    7.0    5.50
## 4308    6.9    6.10
## 4311    7.0    6.00
## 4331    7.0    5.50
## 4355    7.5    6.00
## 4373    7.0    6.00
## 4382    8.5    6.50
## 4385    7.5    6.00
## 4387    7.0    5.50
## 4390    7.5    6.25
## 4392    7.0    5.50
## 4401    7.0    6.25
## 4416    7.0    6.25
## 4417    7.5    6.15
## 4422    7.0    5.75
## 4423    7.0    6.15
## 4424    8.0    6.00
## 4429    7.5    6.50
## 4431    7.5    7.00
## 4435    7.0    5.75
## 4441    7.5    6.25
## 4447    7.5    6.50
## 4458    5.7    5.10
## 4468    6.8    6.05
## 4469    7.5    6.50
## 4472    8.0    6.40
## 4474    7.5    6.50
## 4475    7.5    6.50
## 4476    7.0    6.00
## 4478    7.3    6.10
## 4481    8.5    6.75
## 4483    7.0    6.20
## 4485    7.5    6.65
## 4486    7.5    6.50
## 4487    8.5    7.25
## 4505    7.5    6.25
## 4510    6.8    5.55
## 4513    7.5    6.75
## 4520    7.0    5.75
## 4523    6.5    5.50
```

```
## 4537    8.6    6.80
## 4541    7.0    6.25
## 4542    7.2    6.60
## 4549    8.0    7.00
## 4557    8.0    6.85
## 4558    7.4    6.55
## 4566    6.5    5.25
## 4568    8.5    6.65
## 4600    7.8    6.90
## 4603    8.0    7.30
## 4604    7.5    6.50
## 4608    7.5    6.60
## 4620    7.8    6.80
## 4627    7.2    6.20
## 4632    7.0    6.25
## 4636    6.9    5.90
## 4639    7.0    6.20
## 4643    7.2    6.35
## 4645    7.5    6.00
## 4648    7.0    6.30
## 4656    7.0    5.50
## 4658    6.5    5.50
## 4661    7.8    6.80
## 4675    7.5    6.15
## 4678    6.0    5.25
## 4680    7.5    6.40
## 4688    8.0    6.25
## 4703    7.0    5.50
## 4715    7.0    6.10
## 4725    7.5    6.00
## 4727    6.6    5.80
## 4728    7.2    6.00
## 4730    6.9    6.45
## 4756    8.0    6.00
## 4758    7.5    7.00
## 4760    7.8    6.50
## 4789    6.5    5.50
## 4799    7.5    6.55
## 4800    7.5    6.50
## 4802    7.6    6.55
## 4804    8.0    6.60
## 4840    7.5    6.30
## 4842    8.0    6.75
## 4844    5.7    4.95
## 4850    8.5    6.10
## 4853    8.7    7.10
## 4855    7.0    6.00
## 4856    8.0    6.50
## 4857    7.0    5.90
## 4859    8.0    6.75
## 4860    7.5    6.25
## 4861    7.2    5.85
## 4863    7.5    6.75
## 4866    8.7    7.00
```

```
## 4869    7.0    6.00
## 4870    6.9    6.20
## 4902    7.5    6.10
## 4904    7.5    6.10
## 4912    7.0    5.50
## 4949    8.5    7.45
## 4958    8.0    6.25
## 4961    7.5    6.60
## 4984    7.5    6.15
## 4986    7.3    5.90
## 4989    7.5    6.50
## 4990    7.0    5.95
## 4991    7.0    6.00
## 4994    7.0    5.95
## 4996    7.0    6.10
## 4998    7.5    6.15
## 4999    7.1    5.80
## 5003    7.2    6.55
## 5006    7.0    5.95
## 5009    6.9    6.45
## 5016    7.5    6.75
## 5021    8.0    7.00
## 5024    7.7    6.60
## 5048    7.3    6.65
## 5056    7.0    6.50
## 5066    7.8    6.90
## 5079    7.0    6.15
## 5082    7.0    6.20
## 5086    8.5    7.30
## 5087    8.0    7.00
## 5090    7.5    6.75
## 5104    7.0    5.50
## 5145    7.5    6.50
## 5153    7.4    6.90
## 5158    9.0    6.65
```

```
aggregate(plants$PH_Mean,by=list(plants$Foliage_Color),FUN=mean)
```

```
##        Group.1        x
## 1   Dark Green 5.999390
## 2   Gray-Green 6.370833
## 3        Green 6.175111
## 4          Red 6.400000
## 5   White-Gray 6.444444
## 6 Yellow-Green 5.937500
```

```
aggregate(plants$PH_Mean,by=list(plants$Foliage_Color),FUN=sd)
```

```
##        Group.1         x
## 1   Dark Green 0.5560272
## 2   Gray-Green 0.6387686
## 3        Green 0.5250715
## 4          Red 0.9836158
## 5   White-Gray 0.7380059
## 6 Yellow-Green 0.6043428
```

```r
plants.anova<-aov(plants$PH_Mean~plants$Foliage_Color,data=plants)
F1<-summary(plants.anova)
F1
```

```
##                        Df Sum Sq Mean Sq F value  Pr(>F)
## plants$Foliage_Color    5   5.23  1.0452   3.613 0.00308 **
## Residuals             807 233.48  0.2893
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
plants$Foliage_Color<-plants$Foliage_Color%>%as.factor()%>%as.numeric()
F2<-lm(plants$PH_Mean~plants$Foliage_Color,data=plants)
F2<-summary(F2)
F2
```

```
##
## Call:
## lm(formula = plants$PH_Mean ~ plants$Foliage_Color, data = plants)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.93924 -0.36441 -0.01441  0.33559  2.03559
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)           6.08959    0.06858  88.792   <2e-16 ***
## plants$Foliage_Color  0.02494    0.02297   1.086    0.278
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5421 on 811 degrees of freedom
## Multiple R-squared:  0.001451,   Adjusted R-squared:  0.0002202
## F-statistic: 1.179 on 1 and 811 DF,  p-value: 0.2779
```