Data analysis on Bursera Simaruba's population size structure in a Maya community

Research Objective

This study explores how handicraft production impacted Bursera Simaruba's population size structure in a Maya community. Based on the relevant information that Florencia Pech Cardenas provided, how wood harvesting on Bursera Simaruba's individuals and populations are affected by the plant density, size population structure, and sprouting in harvested and unharvested plots. And how other factors caused this effection.

Study Design

This study happened in south Mexico, central-eastern Yucatan, and there are mainly Maya people. Since deciduous tropical forests are surrounding Yucatan, many people are farmers and woodcarvers, who are surviving by woods in the forest. Bursera Simaruba's is the main wood craving. Therefore the data was collected in Yucatan. When collecting data, held a community meeting with artisans and community authorities at first, then entered the forest with artisans for the area they mainly harvested. After that, established the forest plots with 4 plots per artisan - 2 plots were harvested and 2 plots were not in the last year and collected data. For each plot, chose a circle with 10 meters diameter as a plot and counted numbers of different sizes of trees in a rectangle which has 2 meters as width and 10 meters as height and one short side is on the center of the circle. The size of trees is dependent on DBH - the diameter at breast height. Seedlings' size of tress does not have DBH, which means its DBH is 0. When DBH is from 0 to 4 cm, it is saplings. When DBH is greater than 5cm, it's an adult tree. Basal Area is the cross-sectional area of a single stem, which is determined by DBH. Besides, there are also other factors collected. Milpa is whether this plot was burnt or not before. Vegetation type is the type of vegetable that the plot used to raise, observation is the growing pattern of each tree, forest age is the age of forest, and soil type is the type of plot soil.

Data Analysis

The analysis is based on stem. Firstly, assuming that the growth of trees, which can be measured by basal area(m^2 /ha), is influenced by harvest state, the model can be created:

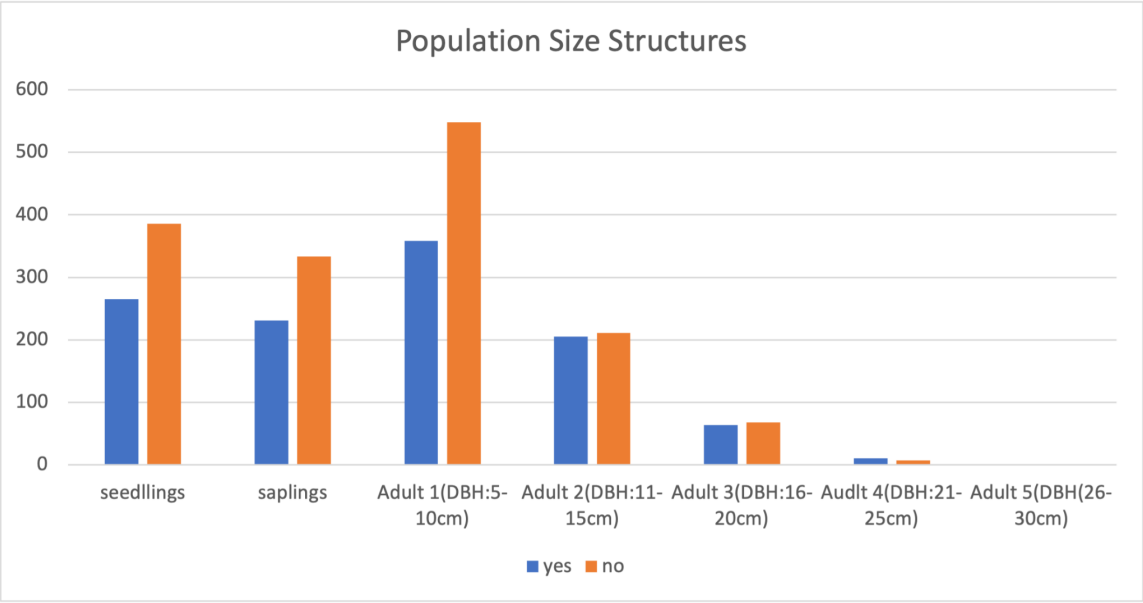
Basal Area= Harvested State + Milpa + Forest Age + Soil Type.

We can get the p-value of the harvested plot is 0.645099, which is greater than the significance level(0.05). Therefore for basal area, there is no significant difference between harvested plot and unharvested plot, which means it cannot be concluded that harvest state influences the

growth of trees. Since milpa, forest age, and soil type with BL, CL, CT, EK, KK. KT has p-values greater than 0.05, so they either cannot explain the difference of harvest state influences on the growth of trees.

Then use another measurement of growth of trees, stem density(number of stem/ha). Also assuming that the growth of trees can be influenced by harvest state. The model would be Stem Density = Harvested State + Milpa + Forest Age + Soil Type.
The p-value of the harvested plot is 0.395, which is greater than the significance level (0.05). Hence there is no significant difference between harvested plot and unharvested plot, which means by using stem density to measure grow of trees, the harvest state doesn't influences the growth of trees. Besides, milpa, forest age, and all soil types have p-value greater than the significance level (0.05), so these variables also cannot explain the difference in harvest state influences on the growth of trees.

Moreover, to make sure how these variables especially impact different population sizes, then separate them into 7 groups to find how each group is impacted by different variables. Groups are: seedlings group (DBH=0), saplings group (0.4cm<DBH≤4cm), adult group 1(5cm≤DBH≤10cm), adult group 2(11cm≤DBH≤15cm), adult group 3(16cm≤DBH≤20cm), adult group 4(21cm≤DBH≤25cm) and adult group 5(26cm≤DBH≤30cm). The graph of population size structure is below, which is approximately normally distributed:



Similar to the second assumption, assuming that each group's stem density(ha) is affected by harvest state. The model of each group are as below:

Seedlings	log(Seedlings) = Harvested State + Milpa + Forest Age + Soiltype
Saplings	log(Saplings) = Harvested State + Milpa + Forest Age +Soiltype
DBH: 5-10cm	log(Adult 1) = Harvested State + Milpa + Forest Age + Soiltype
DBH:11-15cm	Audlt 2 = Harvested State + Milpa + Forest Age + Soiltype
DBH:15-20com	Adult 3 = Harvested State + Milpa + Forest Age + Soiltype
DBH:21-25cm	Adult 4 = Harvested State + Milpa + Forest Age + Soiltype
DBH:26-30cm	Adult 5 = Harvested State + Milpa + Forest Age + Soiltype

For seedlings, saplings and Adult group 1, since their QQ-plot have many outliers at two tails, therefore I transformed independent variables as logarithm form. For other groups, since the population of the older groups is smaller, the original form will be better. For seedlings, saplings, and Adult 1, whether the field is milpa, forest age is 10-15, and some soil types have p-value less than 0.05, therefore we can conclude that these variables can influence the growth of trees in different groups. For groups without transformation, all p-value is greater than 0.05, hence we cannot conclude that there is a significant difference between harvested and unharvested plots for different 7 groups. However, since seedlings, saplings and Adult 1 occupied the majority of the sample, therefore we make decision based on these three groups.

Then using basal area (m^2 /ha) of each group to find the inflectional variables of trees growth. Especially, basal area is based on DBH, so the seedlings group, of which DBH is 0, doesn't have basal area. The models are as blow. Similar result to the previous method, sapling and adult 1, which have larger sample size than other groups, are transformed the independent variables to logarithm form. However, the outcome of these two groups has little difference. For adult group 1, whether the field has been milpa, the age of forest, and some soil type influences the difference between harvest and unharvested plot between different groups (their p-value is less

than 0.05). For saplings, only the milpa situation, age of forest between 16 to 30, and some soil types influence the differences.

Saplings	log(Saplings _BA)= Harvested State + Milpa + Forest Age + Soiltype
DBH: 5-10cm	log(Adult_1_BA) = Harvested State + Milpa + Forest Age + Soiltype
DBH:11-15cm	Audlt_2_BA = Harvested State + Milpa + Forest Age + Soiltype
DBH:15-20com	Adult_3_BA = Harvested State + Milpa + Forest Age + Soiltype
DBH:21-25cm	Adult_4_BA = Harvested State + Milpa + Forest Age + Soiltype
DBH:26-30cm	Adult_5_BA = Harvested State + Milpa + Forest Age + Soiltype

Discussion

Based on some linear models, we can conclude that the growth of trees in Yucatan is influenced by the harvest state of plots. Especially, whether the polt has been milpa, the age of forest and soil types plays the main roles. But there's a limitation due to the small sample size of trees with DBH 25-30cm, which only has 1 data in the whole group. There's p-value is equal to 1 when analyzing linear regression model, which is theoretically shouldn't exist. Therefore it's hard to make conclusions for this group of trees. Besides, since the sample size of adult 2 to adult 5 is not large enough, therefore the result might not be representative for these groups.

Conclusion

The growth of trees in Yucatan has differences between harvested and unharvested plots is mainly influenced by the milpa situation, the forest age and soil types.

Appendix

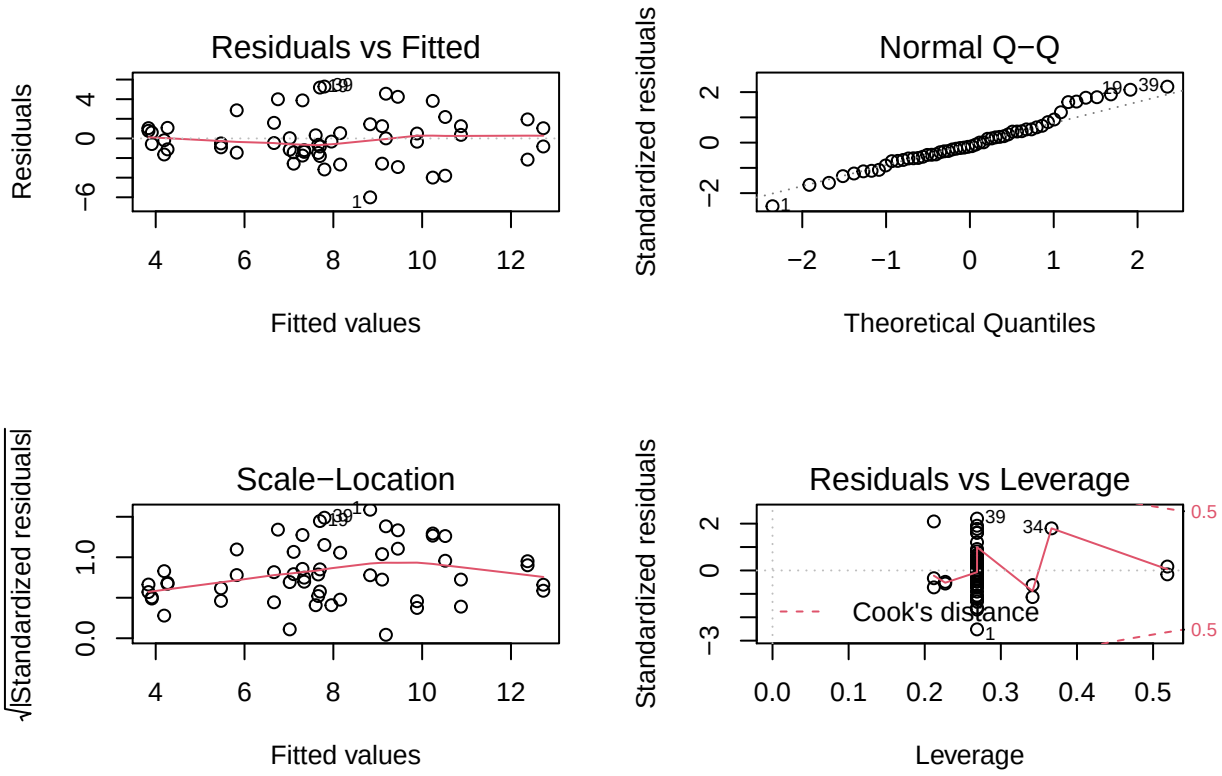
Import data set:

```
seed_cut = read.csv("Seedings_cut.csv")
all_dat = read.csv("All_data.csv")
plot_dat = read.csv("Plots_data.csv")
```

Model for BA:

```
mod1 = lm(plot_dat$Basal.Area..m2.ha.1. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat )

par(mfrow = c(2,2))
plot(mod1)
```




```
summary(mod1)
```

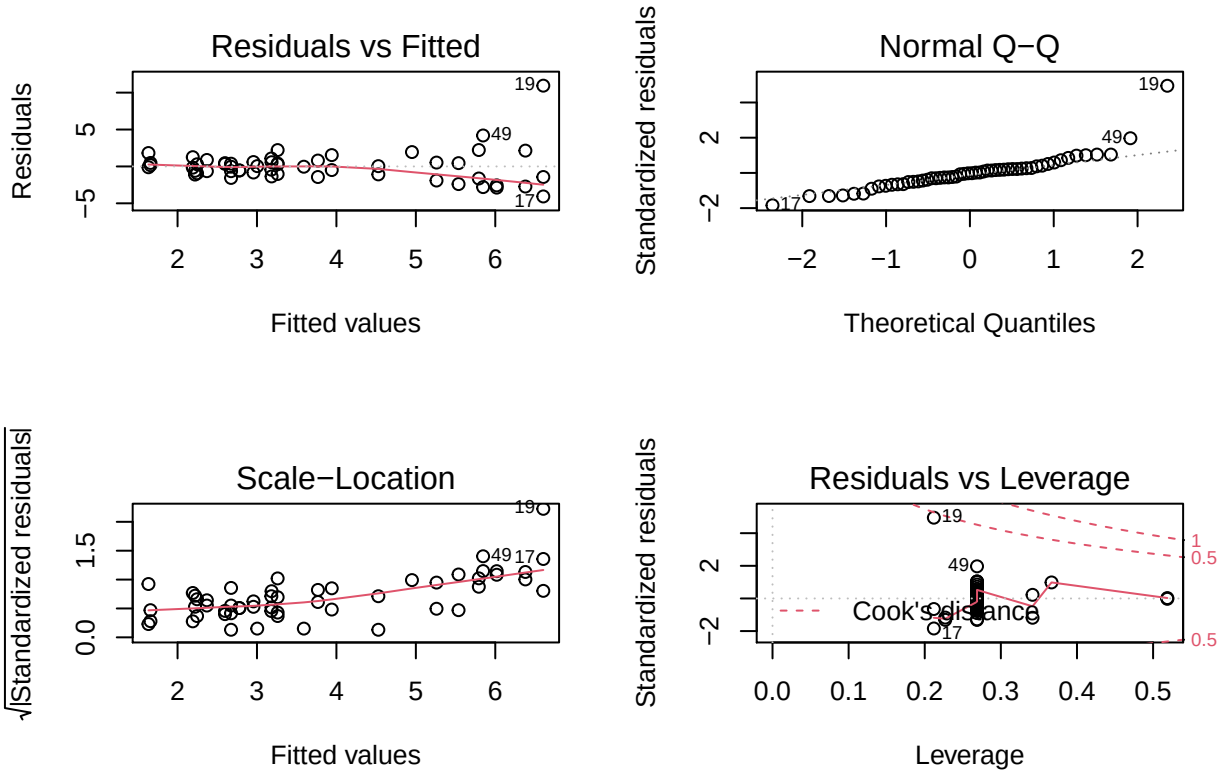
```
##
## Call:
## lm(formula = plot_dat$Basal.Area..m2.ha.1. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
```

```
## -6.005 -1.442 -0.328  1.207  5.283
##
## Coefficients:
##                                                Estimate Std. Error t value
## (Intercept)                                     9.98885    2.44506   4.085
## as.factor(plot_dat$Harvested)Yes               -0.35407    0.76278  -0.464
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No -7.88785    3.41552  -2.309
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -1.13568    1.97195  -0.576
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 -3.06215    3.11793  -0.982
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 -1.83516    1.97195  -0.931
## as.factor(plot_dat$SoilType)BL, CHL             2.09032    2.78876   0.750
## as.factor(plot_dat$SoilType)CL                  3.85544    1.97195   1.955
## as.factor(plot_dat$SoilType)CL, KK              7.35159    2.78876   2.636
## as.factor(plot_dat$SoilType)CT                 -1.19353    1.97195  -0.605
## as.factor(plot_dat$SoilType)EK                  0.08858    2.13374   0.042
## as.factor(plot_dat$SoilType)EL, CHL             5.70967    1.97195   2.895
## as.factor(plot_dat$SoilType)KK                  2.16567    1.97195   1.098
## as.factor(plot_dat$SoilType)KK, BT              1.90663    3.05588   0.624
## as.factor(plot_dat$SoilType)KT                  1.38552    2.78876   0.497
##                                                Pr(>|t|)
## (Intercept)                                    0.000212 ***
## as.factor(plot_dat$Harvested)Yes               0.645099
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No 0.026304 *
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes 0.567979
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 0.332099
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 0.357768
## as.factor(plot_dat$SoilType)BL, CHL            0.458023
## as.factor(plot_dat$SoilType)CL                 0.057760 .
## as.factor(plot_dat$SoilType)CL, KK             0.011974 *
## as.factor(plot_dat$SoilType)CT                 0.548517
## as.factor(plot_dat$SoilType)EK                 0.967099
## as.factor(plot_dat$SoilType)EL, CHL            0.006174 **
## as.factor(plot_dat$SoilType)KK                 0.278834
## as.factor(plot_dat$SoilType)KK, BT             0.536312
## as.factor(plot_dat$SoilType)KT                 0.622103
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.789 on 39 degrees of freedom
## Multiple R-squared:  0.4953, Adjusted R-squared:  0.3141
## F-statistic: 2.734 on 14 and 39 DF,  p-value: 0.006686
```

Stem density model:

```
mod2 = lm(plot_dat$Stem.density....ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)

par(mfrow = c(2,2))
plot(mod2)
```



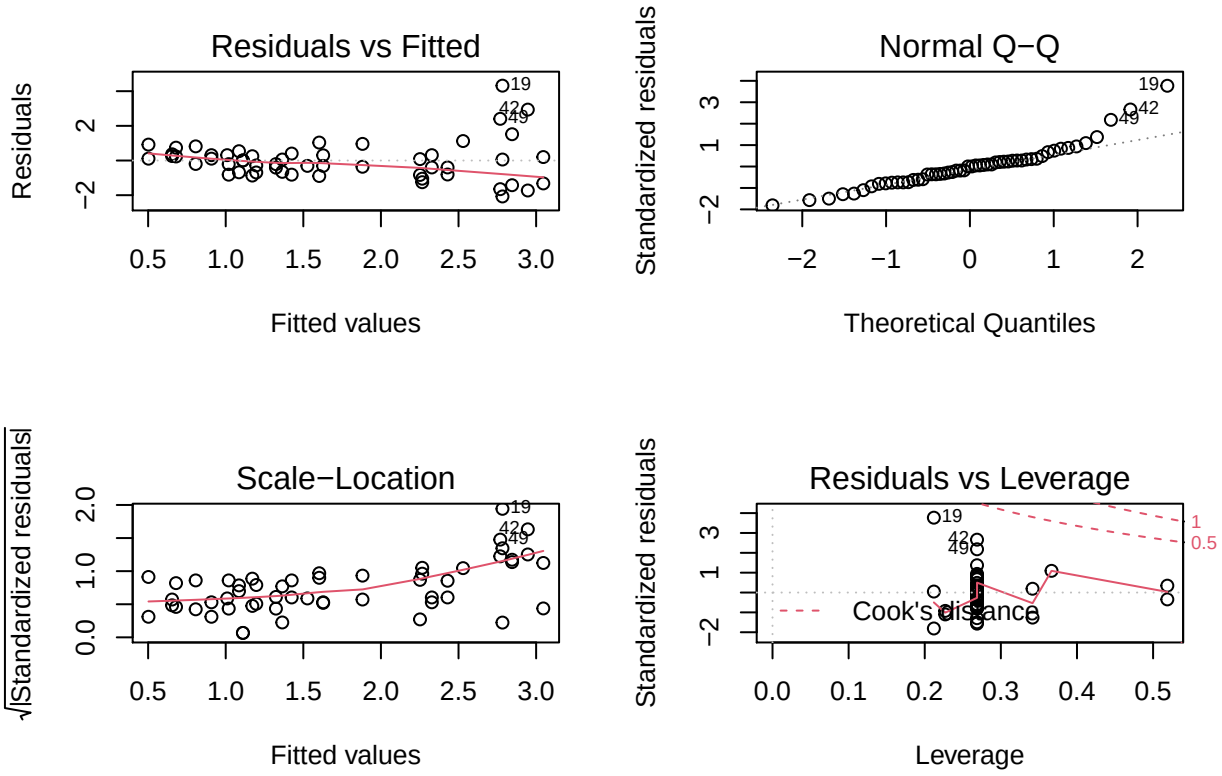

```
summary(mod2)
```

```
##
## Call:
## lm(formula = plot_dat$Stem.density....ha. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -4.0687 -1.0666 -0.0380  0.5571 10.9434
##
## Coefficients:
##                                                Estimate Std. Error t value
## (Intercept)                                      3.4883     2.1838   1.597
## as.factor(plot_dat$Harvested)Yes                -0.5863     0.6813  -0.861
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No  -0.2029     3.0506  -0.067
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -0.7607     1.7612  -0.432
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  1.3693     2.7848   0.492
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  1.0397     1.7612   0.590
## as.factor(plot_dat$SoilType)BL, CHL             -1.0397     2.4908  -0.417
## as.factor(plot_dat$SoilType)CL                   2.0794     1.7612   1.181
## as.factor(plot_dat$SoilType)CL, KK              -0.3297     2.4908  -0.132
## as.factor(plot_dat$SoilType)CT                  -0.5072     1.7612  -0.288
## as.factor(plot_dat$SoilType)EK                   1.7703     1.9057   0.929
## as.factor(plot_dat$SoilType)EL, CHL              2.6119     1.7612   1.483
## as.factor(plot_dat$SoilType)KK                  -0.5072     1.7612  -0.288
## as.factor(plot_dat$SoilType)KK, BT               2.5076     2.7294   0.919
```

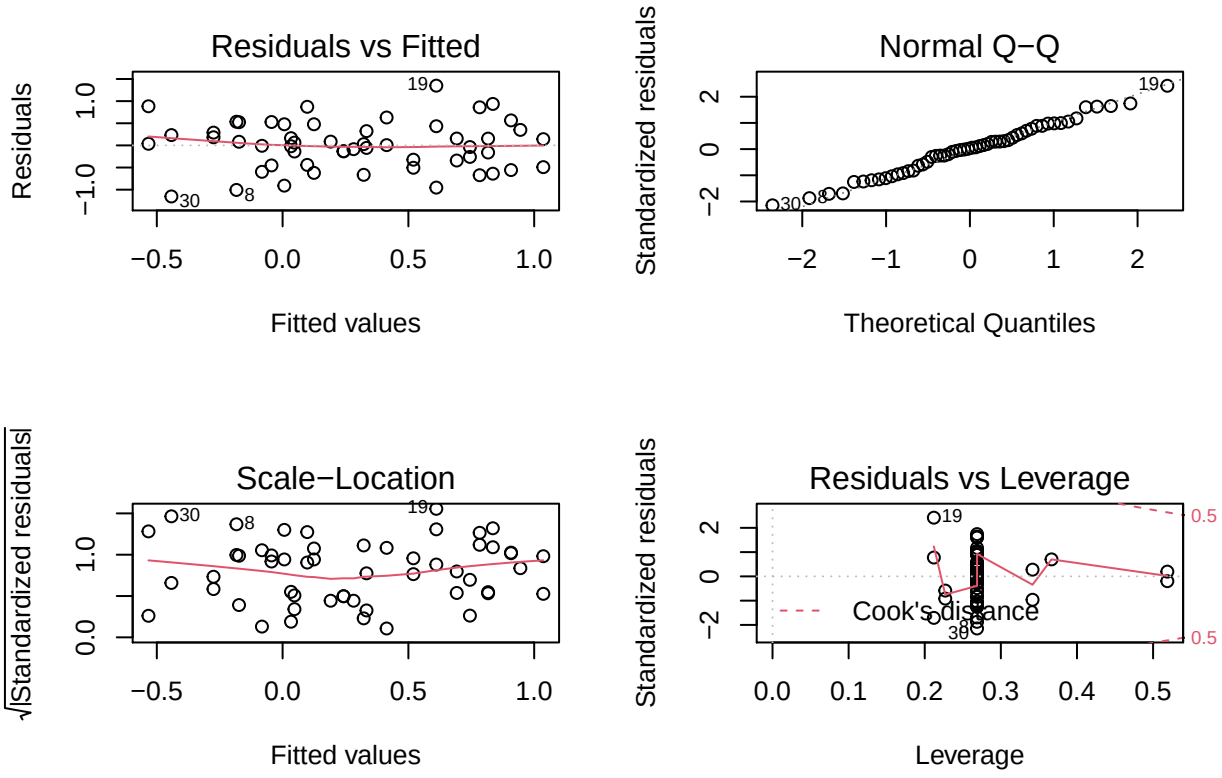
```
## as.factor(plot_dat$SoilType)KT                   0.4564     2.4908   0.183
##                                                Pr(>|t|)
## (Intercept)                                       0.118
## as.factor(plot_dat$Harvested)Yes                  0.395
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No    0.947
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes   0.668
## as.factor(plot_dat$Forest.sAge..years.)10 to 15   0.626
## as.factor(plot_dat$Forest.sAge..years.)16 to 30   0.558
## as.factor(plot_dat$SoilType)BL, CHL               0.679
## as.factor(plot_dat$SoilType)CL                    0.245
## as.factor(plot_dat$SoilType)CL, KK                0.895
## as.factor(plot_dat$SoilType)CT                    0.775
## as.factor(plot_dat$SoilType)EK                    0.359
## as.factor(plot_dat$SoilType)EL, CHL               0.146
## as.factor(plot_dat$SoilType)KK                    0.775
## as.factor(plot_dat$SoilType)KK, BT                0.364
## as.factor(plot_dat$SoilType)KT                    0.856
##
## Residual standard error: 2.491 on 39 degrees of freedom
## Multiple R-squared:  0.3464, Adjusted R-squared:  0.1117
## F-statistic: 1.476 on 14 and 39 DF,  p-value: 0.1662
```

population size structures (stem density with ha):

```
## group 1
mod_group1 = lm(plot_dat$Adult_1...ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group1)
```




```
mod_group1_log <- lm(log(plot_dat$Adult_1...ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group1_log)
```



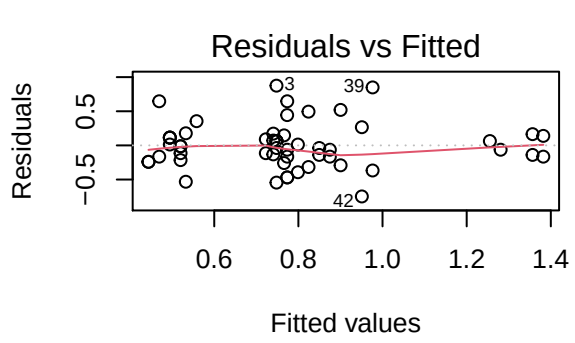

```
summary(mod_group1_log)
```

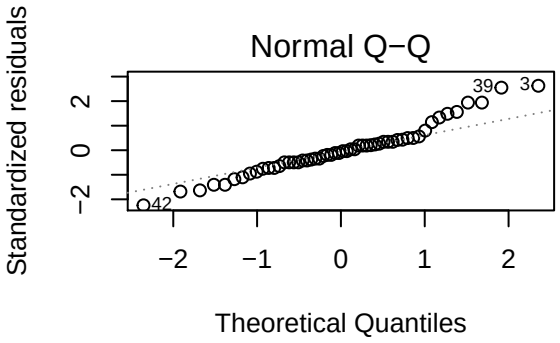
```
##
## Call:
## lm(formula = log(plot_dat$Adult_1...ha.) ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.15328 -0.41565  0.01725  0.34324  1.34921
##
## Coefficients:
##                                                  Estimate Std. Error t value
## (Intercept)                                       0.06020    0.55096   0.109
## as.factor(plot_dat$Harvested)Yes                 -0.09116    0.17188  -0.530
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No    0.17334    0.76963   0.225
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -0.42211    0.44435  -0.950
## as.factor(plot_dat$Forest.sAge..years.)10 to 15   0.95965    0.70258   1.366
## as.factor(plot_dat$Forest.sAge..years.)16 to 30   0.77544    0.44435   1.745
## as.factor(plot_dat$SoilType)BL, CHL              -0.41695    0.62840  -0.664
## as.factor(plot_dat$SoilType)CL                    0.36976    0.44435   0.832
## as.factor(plot_dat$SoilType)CL, KK               -0.18645    0.62840  -0.297
## as.factor(plot_dat$SoilType)CT                   -0.08001    0.44435  -0.180
## as.factor(plot_dat$SoilType)EK                    0.62266    0.48081   1.295
## as.factor(plot_dat$SoilType)EL, CHL               0.49439    0.44435   1.113
## as.factor(plot_dat$SoilType)KK                   -0.31558    0.44435  -0.710
## as.factor(plot_dat$SoilType)KK, BT                0.01319    0.68860   0.019
```

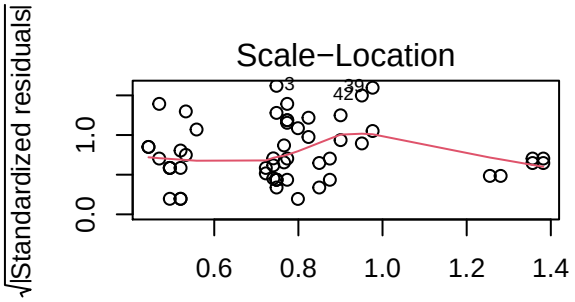
```
## as.factor(plot_dat$SoilType)KT                  0.48654    0.62840   0.774
##                                                Pr(>|t|)
## (Intercept)                                      0.9136
## as.factor(plot_dat$Harvested)Yes                 0.5989
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No   0.8230
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes  0.3480
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.1798
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  0.0888 .
## as.factor(plot_dat$SoilType)BL, CHL              0.5109
## as.factor(plot_dat$SoilType)CL                   0.4104
## as.factor(plot_dat$SoilType)CL, KK               0.7683
## as.factor(plot_dat$SoilType)CT                   0.8580
## as.factor(plot_dat$SoilType)EK                   0.2029
## as.factor(plot_dat$SoilType)EL, CHL              0.2727
## as.factor(plot_dat$SoilType)KK                   0.4818
## as.factor(plot_dat$SoilType)KK, BT               0.9848
## as.factor(plot_dat$SoilType)KT                   0.4434
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6284 on 39 degrees of freedom
## Multiple R-squared:  0.3967, Adjusted R-squared:  0.1801
## F-statistic: 1.831 on 14 and 39 DF,  p-value: 0.06855
```

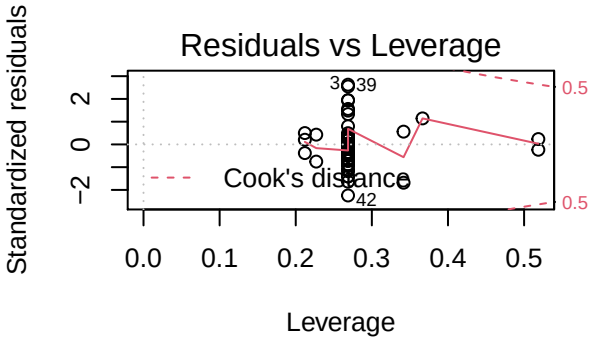
group 2:

```
mod_group2 = lm(plot_dat$Audlt_2...ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group2)
```







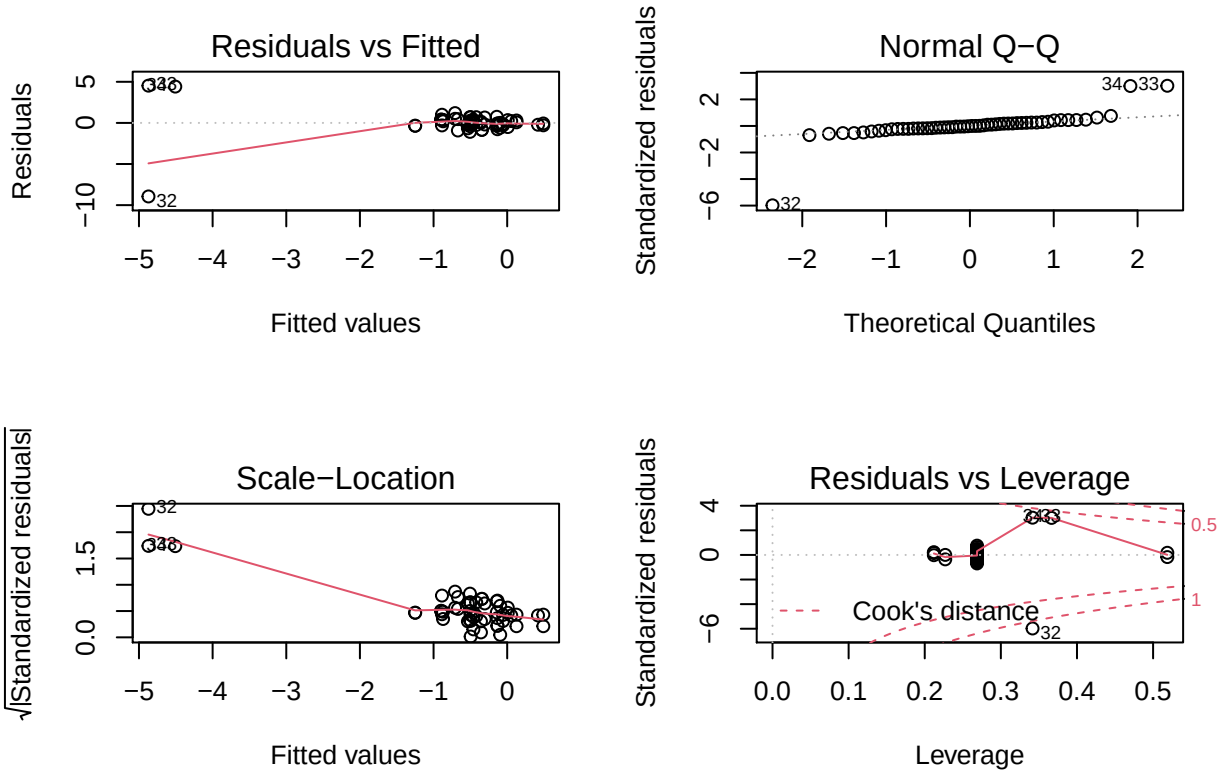



```
summary(mod_group2)
```

```
##
## Call:
## lm(formula = plot_dat$Audlt_2...ha. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.74797 -0.16492 -0.02545  0.13308  0.87496
##
## Coefficients:
##                                                  Estimate Std. Error t value
## (Intercept)                                     5.705e-01  3.416e-01   1.670
## as.factor(plot_dat$Harvested)Yes                2.555e-02  1.066e-01   0.240
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No  -7.607e-02  4.772e-01  -0.159
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -2.029e-01  2.755e-01  -0.736
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  8.875e-01  4.356e-01   2.037
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  3.804e-01  2.755e-01   1.381
## as.factor(plot_dat$SoilType)BL, CHL              2.886e-15  3.897e-01   0.000
## as.factor(plot_dat$SoilType)CL                   1.268e-01  2.755e-01   0.460
## as.factor(plot_dat$SoilType)CL, KK               2.789e-01  3.897e-01   0.716
## as.factor(plot_dat$SoilType)CT                   7.607e-02  2.755e-01   0.276
## as.factor(plot_dat$SoilType)EK                  -2.155e-01  2.981e-01  -0.723
## as.factor(plot_dat$SoilType)EL, CHL              6.086e-01  2.755e-01   2.209
## as.factor(plot_dat$SoilType)KK                   2.218e-15  2.755e-01   0.000
## as.factor(plot_dat$SoilType)KK, BT              -5.148e-01  4.270e-01  -1.206
```

```
## as.factor(plot_dat$SoilType)KT                  3.550e-01  3.897e-01   0.911
##                                                Pr(>|t|)
## (Intercept)                                      0.1030
## as.factor(plot_dat$Harvested)Yes                 0.8118
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No   0.8742
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes  0.4660
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.0484 *
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  0.1753
## as.factor(plot_dat$SoilType)BL, CHL              1.0000
## as.factor(plot_dat$SoilType)CL                   0.6479
## as.factor(plot_dat$SoilType)CL, KK               0.4783
## as.factor(plot_dat$SoilType)CT                   0.7839
## as.factor(plot_dat$SoilType)EK                   0.4741
## as.factor(plot_dat$SoilType)EL, CHL              0.0331 *
## as.factor(plot_dat$SoilType)KK                   1.0000
## as.factor(plot_dat$SoilType)KK, BT               0.2352
## as.factor(plot_dat$SoilType)KT                   0.3678
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3897 on 39 degrees of freedom
## Multiple R-squared:  0.3557, Adjusted R-squared:  0.1244
## F-statistic: 1.538 on 14 and 39 DF,  p-value: 0.143
```

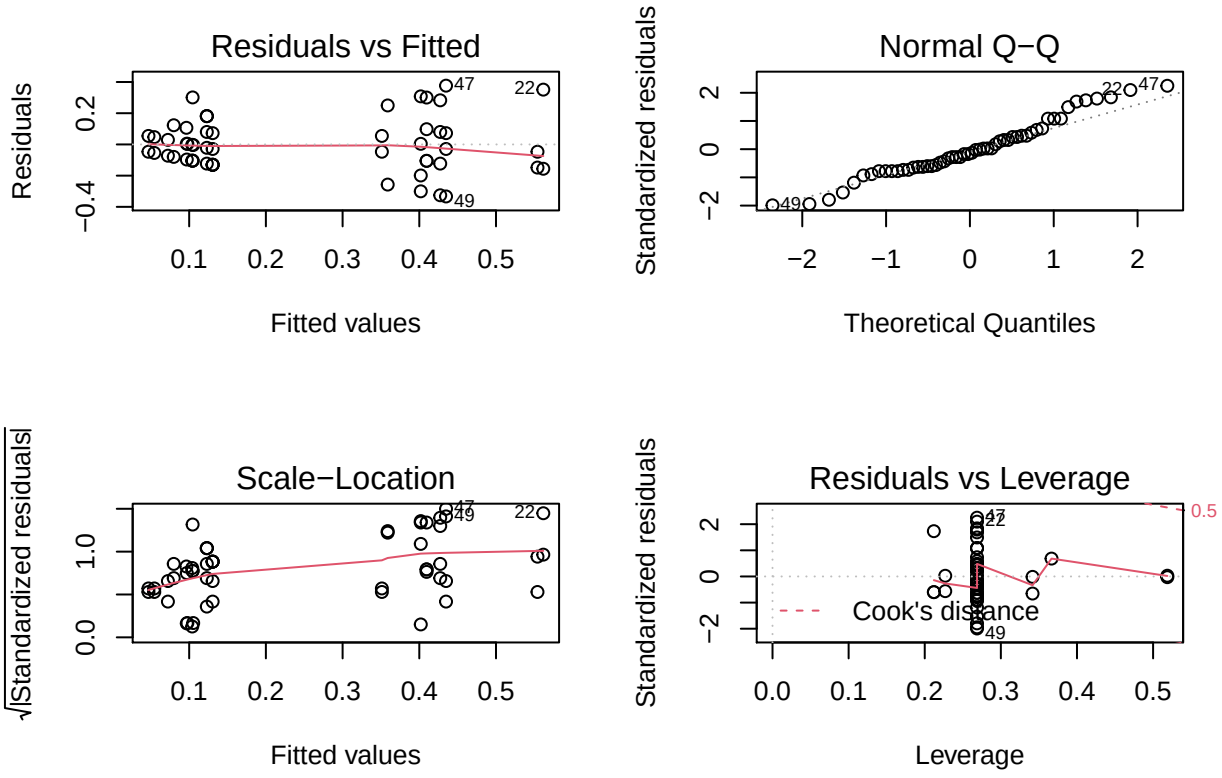
```
plot_dat$Audlt_2...ha.[plot_dat$Audlt_2...ha. == 0] <-  0.000001
mod_group2_log = lm(log(plot_dat$Audlt_2...ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group2_log)
```



group 3:

```
mod_group3 = lm(plot_dat$Audlt_3...ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)

par(mfrow = c(2,2))
plot(mod_group3)
```



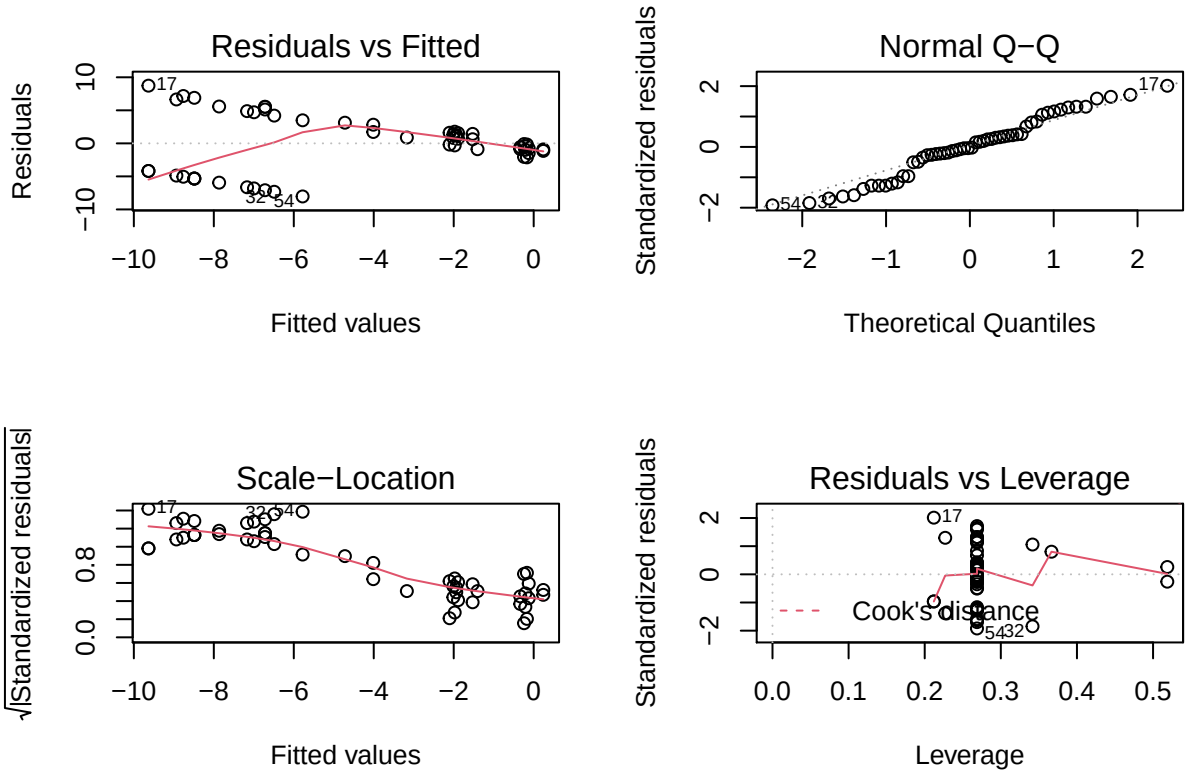

```
summary(mod_group3)
```

```
##
## Call:
## lm(formula = plot_dat$Audlt_3...ha. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.33345 -0.10523 -0.02536  0.07987  0.37658
##
## Coefficients:
##                                                  Estimate Std. Error t value
## (Intercept)                                     5.110e-01  1.717e-01   2.975
## as.factor(plot_dat$Harvested)Yes                -7.589e-03  5.357e-02  -0.142
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No  -7.100e-01  2.399e-01  -2.960
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -1.007e-15  1.385e-01   0.000
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 -6.847e-01  2.190e-01  -3.127
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 -3.804e-01  1.385e-01  -2.746
## as.factor(plot_dat$SoilType)BL, CHL              3.297e-01  1.959e-01   1.683
## as.factor(plot_dat$SoilType)CL                   3.043e-01  1.385e-01   2.197
## as.factor(plot_dat$SoilType)CL, KK               6.086e-01  1.959e-01   3.107
## as.factor(plot_dat$SoilType)CT                  -7.607e-02  1.385e-01  -0.549
## as.factor(plot_dat$SoilType)EK                  -2.662e-02  1.499e-01  -0.178
## as.factor(plot_dat$SoilType)EL, CHL              2.282e-01  1.385e-01   1.648
## as.factor(plot_dat$SoilType)KK                   2.789e-01  1.385e-01   2.014
## as.factor(plot_dat$SoilType)KK, BT               2.782e-01  2.146e-01   1.296
```

```
## as.factor(plot_dat$SoilType)KT                   5.072e-02  1.959e-01   0.259
##                                                 Pr(>|t|)
## (Intercept)                                      0.00500 **
## as.factor(plot_dat$Harvested)Yes                 0.88809
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No   0.00521 **
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes  1.00000
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.00334 **
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  0.00907 **
## as.factor(plot_dat$SoilType)BL, CHL              0.10036
## as.factor(plot_dat$SoilType)CL                   0.03402 *
## as.factor(plot_dat$SoilType)CL, KK               0.00352 **
## as.factor(plot_dat$SoilType)CT                   0.58595
## as.factor(plot_dat$SoilType)EK                   0.85992
## as.factor(plot_dat$SoilType)EL, CHL              0.10742
## as.factor(plot_dat$SoilType)KK                   0.05094 .
## as.factor(plot_dat$SoilType)KK, BT               0.20256
## as.factor(plot_dat$SoilType)KT                   0.79705
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1959 on 39 degrees of freedom
## Multiple R-squared:  0.5109, Adjusted R-squared:  0.3353
## F-statistic:  2.91 on 14 and 39 DF,  p-value: 0.004274
```

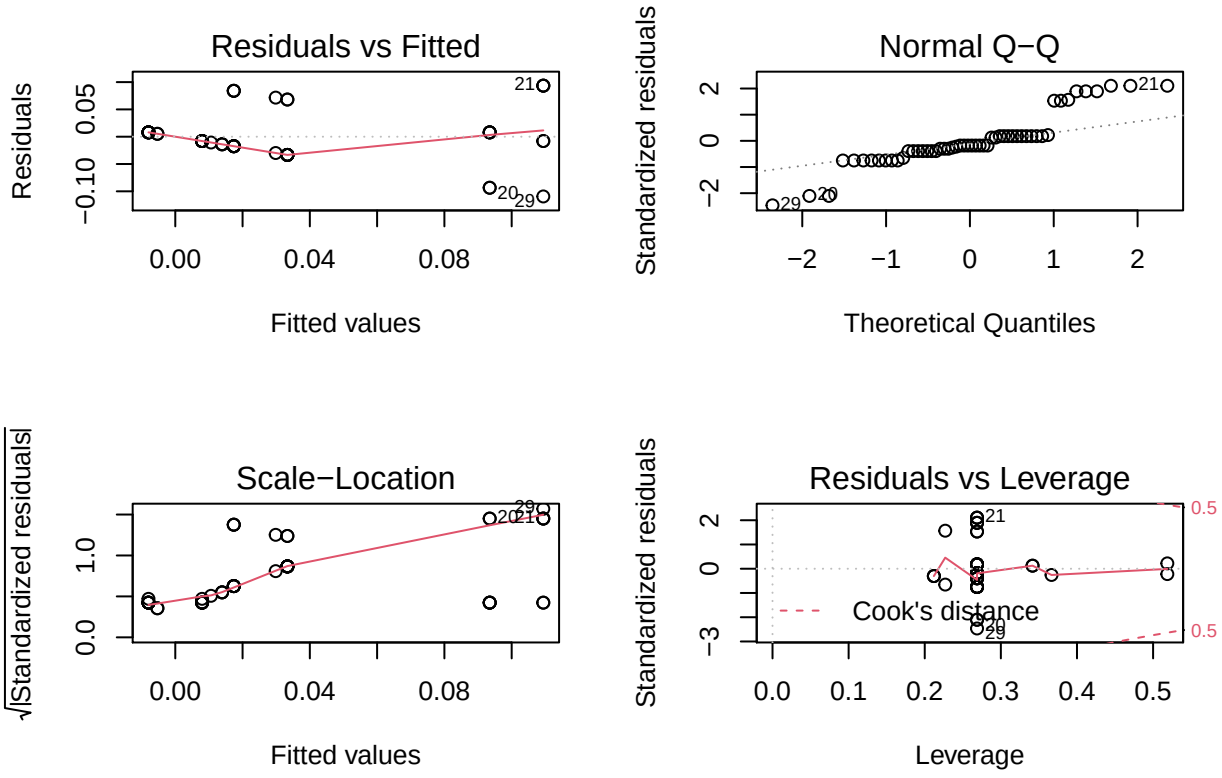
```
plot_dat$Audlt_3...ha.[plot_dat$Audlt_3...ha. == 0] <-  0.000001
mod_group3_log = lm(log(plot_dat$Audlt_3...ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)

par(mfrow = c(2,2))
plot(mod_group3_log)
```



group 4:

```
mod_group4 = lm(plot_dat$Audlt_4...ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group4)
```

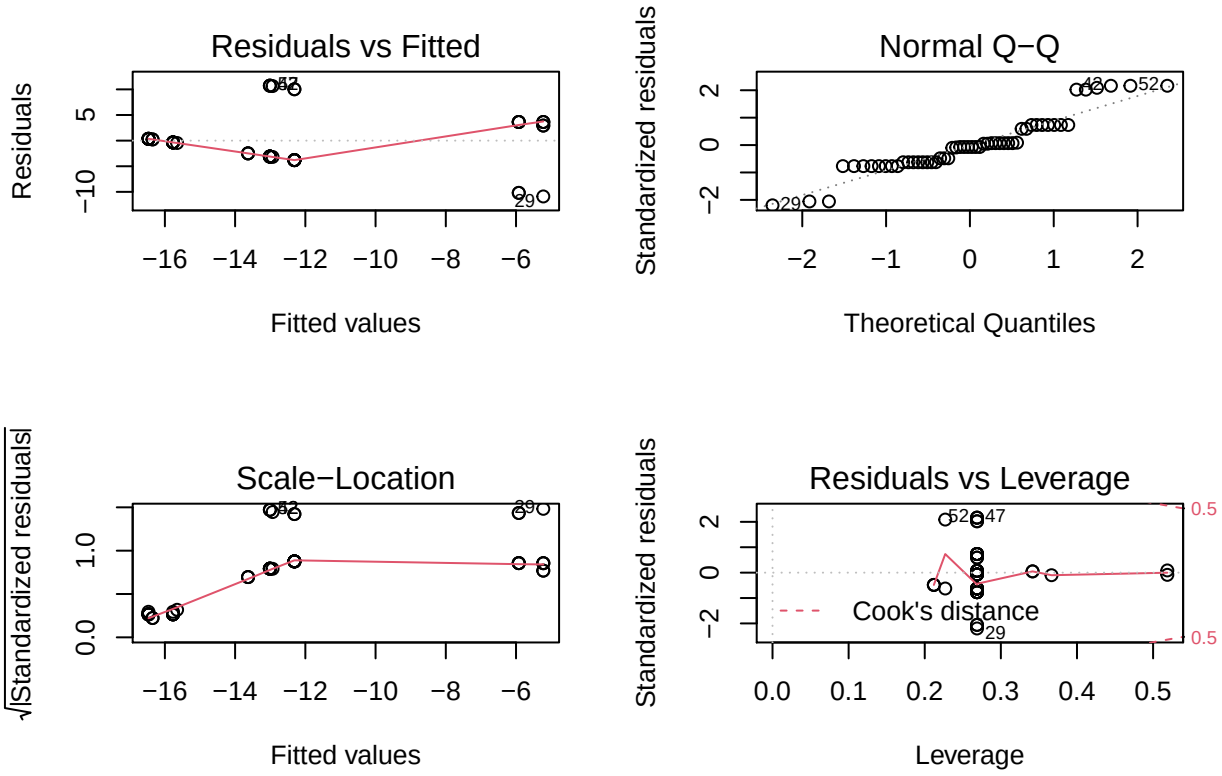



```
summary(mod_group4)
```

```
##
## Call:
## lm(formula = plot_dat$Audlt_4...ha. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.109401 -0.017390 -0.007968  0.007968  0.093465
##
## Coefficients:
##                                                  Estimate Std. Error t value
## (Intercept)                                     1.188e-01  4.553e-02   2.610
## as.factor(plot_dat$Harvested)Yes                1.594e-02  1.420e-02   1.122
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No  -1.268e-01  6.359e-02  -1.994
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -6.201e-17  3.672e-02   0.000
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 -1.268e-01  5.805e-02  -2.184
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 -1.014e-01  3.672e-02  -2.763
## as.factor(plot_dat$SoilType)BL, CHL              2.536e-02  5.192e-02   0.488
## as.factor(plot_dat$SoilType)CL                   3.258e-17  3.672e-02   0.000
## as.factor(plot_dat$SoilType)CL, KK               1.014e-01  5.192e-02   1.953
## as.factor(plot_dat$SoilType)CT                  -2.536e-02  3.672e-02  -0.691
## as.factor(plot_dat$SoilType)EK                  -2.270e-02  3.973e-02  -0.571
## as.factor(plot_dat$SoilType)EL, CHL             -2.536e-02  3.672e-02  -0.691
## as.factor(plot_dat$SoilType)KK                   1.026e-16  3.672e-02   0.000
## as.factor(plot_dat$SoilType)KK, BT               2.188e-02  5.690e-02   0.385
```

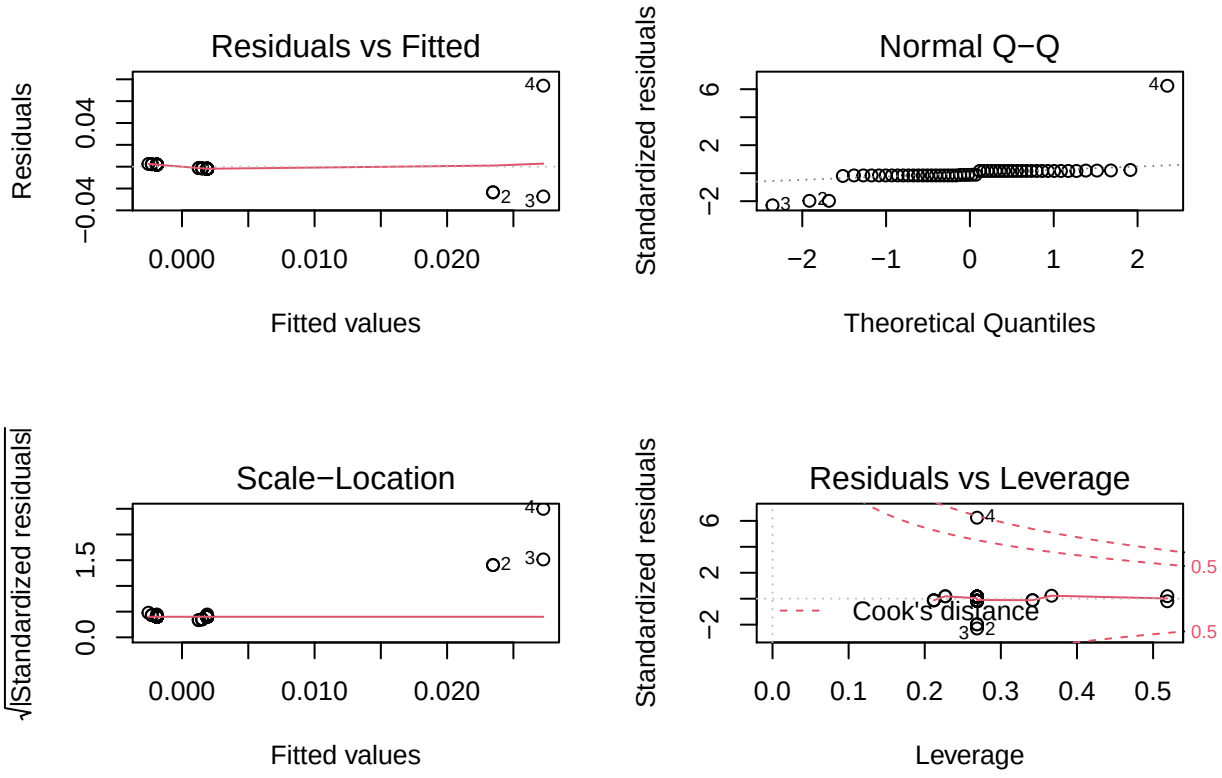
```
## as.factor(plot_dat$SoilType)KT                 -2.536e-02  5.192e-02  -0.488
##                                                Pr(>|t|)
## (Intercept)                                      0.0128 *
## as.factor(plot_dat$Harvested)Yes                 0.2687
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No   0.0532 .
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes  1.0000
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.0350 *
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  0.0087 **
## as.factor(plot_dat$SoilType)BL, CHL              0.6280
## as.factor(plot_dat$SoilType)CL                   1.0000
## as.factor(plot_dat$SoilType)CL, KK               0.0580 .
## as.factor(plot_dat$SoilType)CT                   0.4939
## as.factor(plot_dat$SoilType)EK                   0.5710
## as.factor(plot_dat$SoilType)EL, CHL              0.4939
## as.factor(plot_dat$SoilType)KK                   1.0000
## as.factor(plot_dat$SoilType)KK, BT               0.7027
## as.factor(plot_dat$SoilType)KT                   0.6280
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.05192 on 39 degrees of freedom
## Multiple R-squared:  0.4322, Adjusted R-squared:  0.2284
## F-statistic: 2.121 on 14 and 39 DF,  p-value: 0.03255
```

```
plot_dat$Audlt_4...ha.[plot_dat$Audlt_4...ha. == 0] <-  0.0000001
mod_group4_log = lm(log(plot_dat$Audlt_4...ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group4_log)
```



group 5:

```
mod_group5 = lm(plot_dat$Audlt_5...ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group5)
```

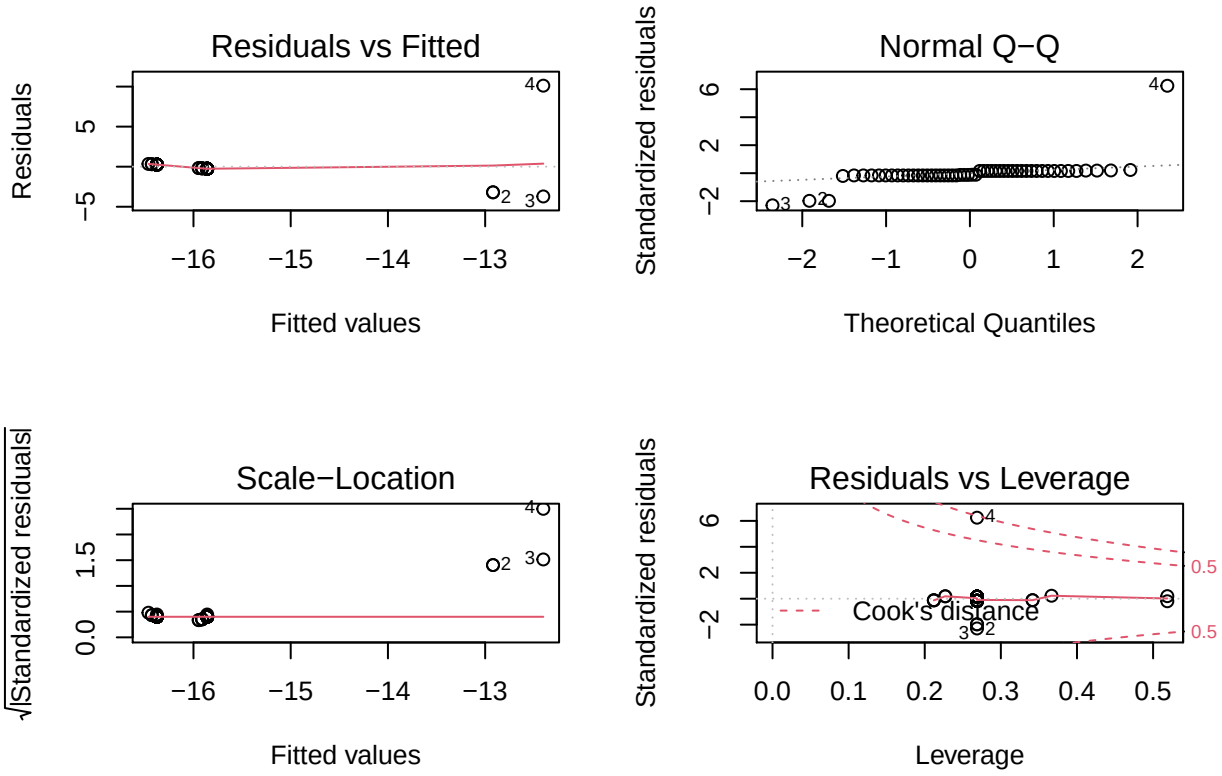



```
summary(mod_group5)
```

```
##
## Call:
## lm(formula = plot_dat$Audlt_5...ha. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.027255 -0.001897 -0.001391  0.001897  0.074178
##
## Coefficients:
##                                                  Estimate Std. Error t value
## (Intercept)                                     1.897e-03  1.218e-02   0.156
## as.factor(plot_dat$Harvested)Yes                -3.794e-03  3.799e-03  -0.999
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No  -2.536e-02  1.701e-02  -1.491
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -2.827e-17  9.822e-03   0.000
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 -2.536e-02  1.553e-02  -1.633
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 -1.193e-17  9.822e-03   0.000
## as.factor(plot_dat$SoilType)BL, CHL              2.536e-02  1.389e-02   1.826
## as.factor(plot_dat$SoilType)CL                  -2.087e-17  9.822e-03   0.000
## as.factor(plot_dat$SoilType)CL, KK               2.536e-02  1.389e-02   1.826
## as.factor(plot_dat$SoilType)CT                  -2.964e-17  9.822e-03   0.000
## as.factor(plot_dat$SoilType)EK                  -6.324e-04  1.063e-02  -0.060
## as.factor(plot_dat$SoilType)EL, CHL             -1.866e-17  9.822e-03   0.000
## as.factor(plot_dat$SoilType)KK                   2.536e-02  9.822e-03   2.582
## as.factor(plot_dat$SoilType)KK, BT               2.498e-02  1.522e-02   1.641
```

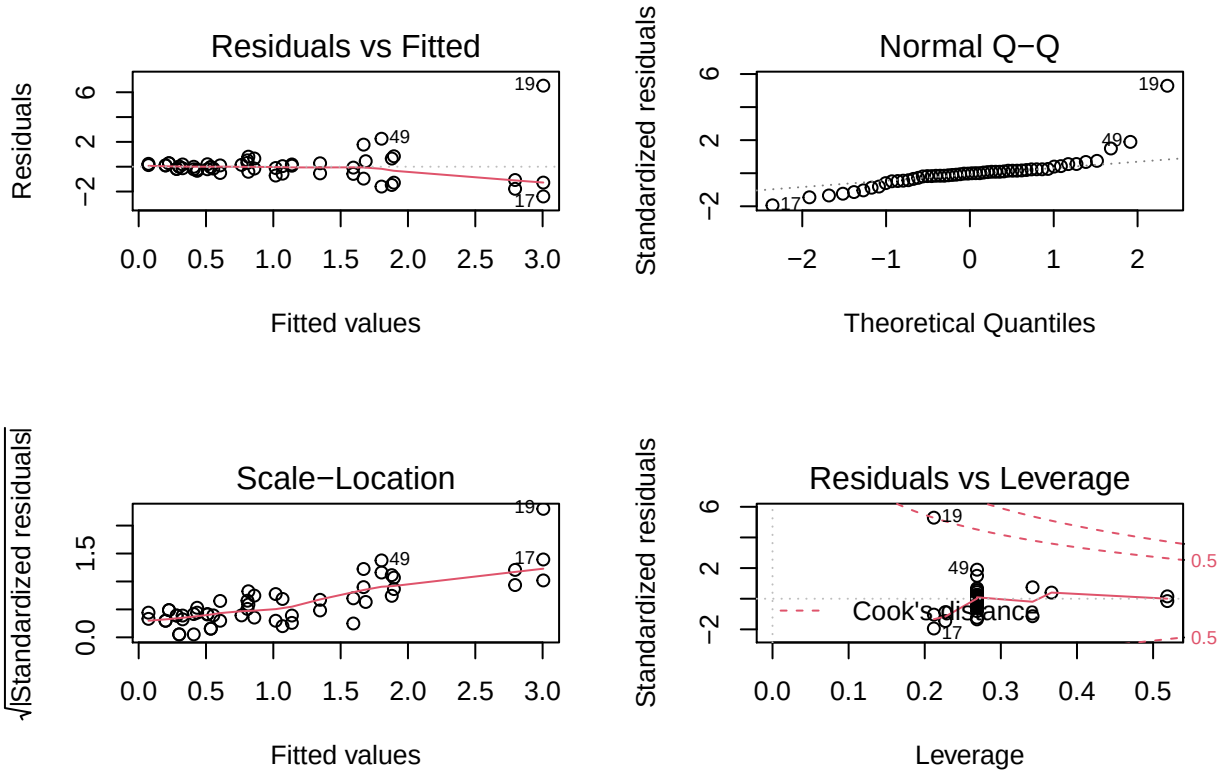
```
## as.factor(plot_dat$SoilType)KT                 -2.776e-17  1.389e-02   0.000
##                                                Pr(>|t|)
## (Intercept)                                      0.8770
## as.factor(plot_dat$Harvested)Yes                 0.3241
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No   0.1441
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes  1.0000
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.1105
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  1.0000
## as.factor(plot_dat$SoilType)BL, CHL              0.0756 .
## as.factor(plot_dat$SoilType)CL                   1.0000
## as.factor(plot_dat$SoilType)CL, KK               0.0756 .
## as.factor(plot_dat$SoilType)CT                   1.0000
## as.factor(plot_dat$SoilType)EK                   0.9529
## as.factor(plot_dat$SoilType)EL, CHL              1.0000
## as.factor(plot_dat$SoilType)KK                   0.0137 *
## as.factor(plot_dat$SoilType)KK, BT               0.1088
## as.factor(plot_dat$SoilType)KT                   1.0000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.01389 on 39 degrees of freedom
## Multiple R-squared:  0.2549, Adjusted R-squared:  -0.01256
## F-statistic: 0.953 on 14 and 39 DF,  p-value: 0.5151
```

```
plot_dat$Audlt_5...ha.[plot_dat$Audlt_5...ha. == 0] <-  0.0000001
mod_group5 = lm(log(plot_dat$Audlt_5...ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group5)
```

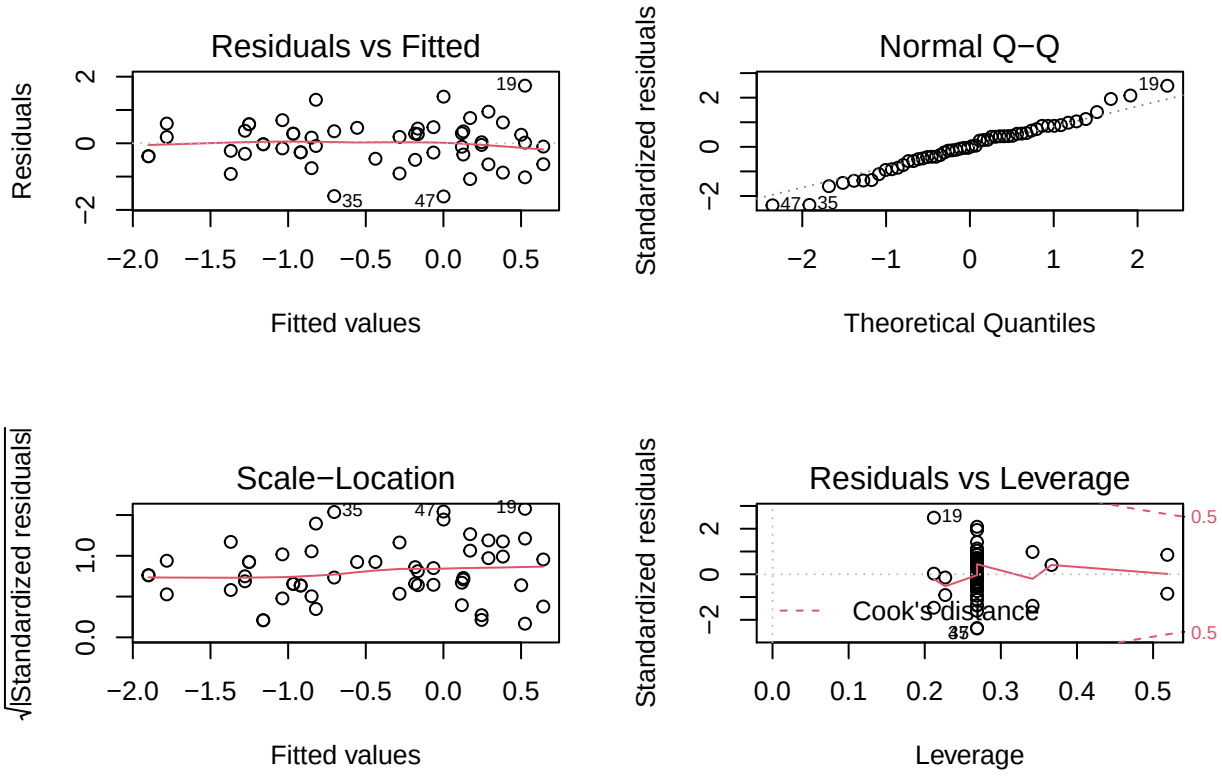


sapling:

```
mod_group_sap = lm(plot_dat$Saplings....ha.~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_sap)
```




```
mod_group_sap_log = lm(log(plot_dat$Saplings....ha.)~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_sap_log)
```



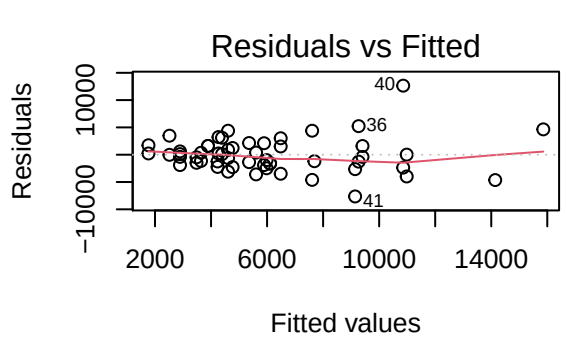

```
summary(mod_group_sap_log)
```

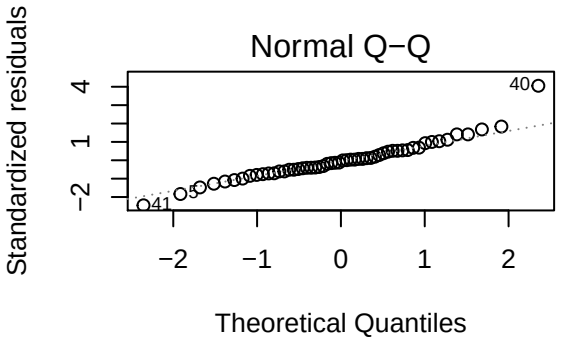
```
##
## Call:
## lm(formula = log(plot_dat$Saplings....ha.) ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.59609 -0.37603 -0.00497  0.37224  1.72963
##
## Coefficients:
##                                                Estimate Std. Error t value
## (Intercept)                                   -0.950075   0.687695  -1.382
## as.factor(plot_dat$Harvested)Yes               0.117865   0.214538   0.549
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No   1.522344   0.960644   1.585
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -0.410801   0.554628  -0.741
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  1.559581   0.876944   1.778
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  1.078258   0.554628   1.944
## as.factor(plot_dat$SoilType)BL, CHL           -1.539192   0.784362  -1.962
## as.factor(plot_dat$SoilType)CL                 0.283495   0.554628   0.511
## as.factor(plot_dat$SoilType)CL, KK            -1.850390   0.784362  -2.359
## as.factor(plot_dat$SoilType)CT                -0.538472   0.554628  -0.971
## as.factor(plot_dat$SoilType)EK                 0.665680   0.600133   1.109
## as.factor(plot_dat$SoilType)EL, CHL            0.454690   0.554628   0.820
## as.factor(plot_dat$SoilType)KK                -0.754234   0.554628  -1.360
## as.factor(plot_dat$SoilType)KK, BT             0.326607   0.859494   0.380
```

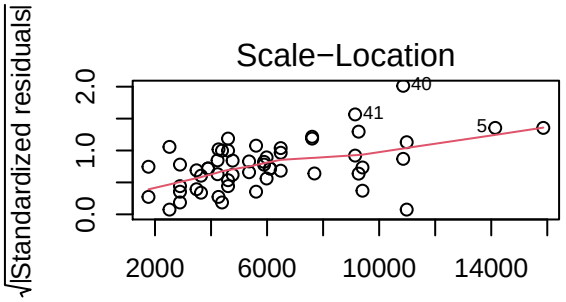
```
## as.factor(plot_dat$SoilType)KT                 -0.008406   0.784362  -0.011
##                                                Pr(>|t|)
## (Intercept)                                      0.1750
## as.factor(plot_dat$Harvested)Yes                 0.5859
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No   0.1211
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes  0.4633
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.0831 .
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  0.0591 .
## as.factor(plot_dat$SoilType)BL, CHL              0.0569 .
## as.factor(plot_dat$SoilType)CL                   0.6121
## as.factor(plot_dat$SoilType)CL, KK               0.0234 *
## as.factor(plot_dat$SoilType)CT                   0.3376
## as.factor(plot_dat$SoilType)EK                   0.2741
## as.factor(plot_dat$SoilType)EL, CHL              0.4173
## as.factor(plot_dat$SoilType)KK                   0.1817
## as.factor(plot_dat$SoilType)KK, BT               0.7060
## as.factor(plot_dat$SoilType)KT                   0.9915
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7844 on 39 degrees of freedom
## Multiple R-squared:  0.5408, Adjusted R-squared:  0.3759
## F-statistic:  3.28 on 14 and 39 DF,  p-value: 0.001696
```

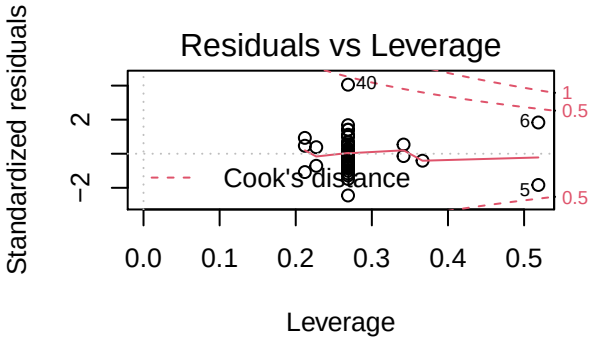
seedlings:

```
mod_group_sed = lm(plot_dat$Seedling.density....ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_sed)
```

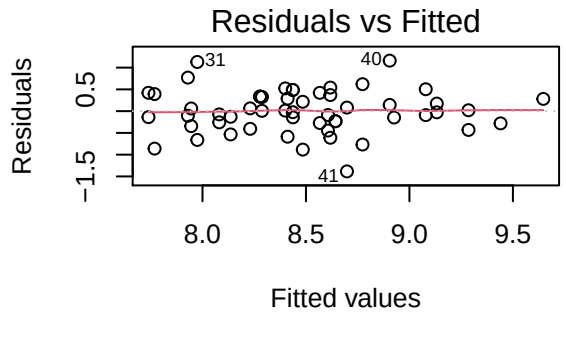


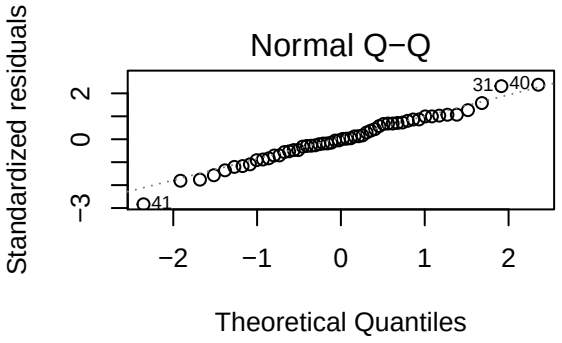


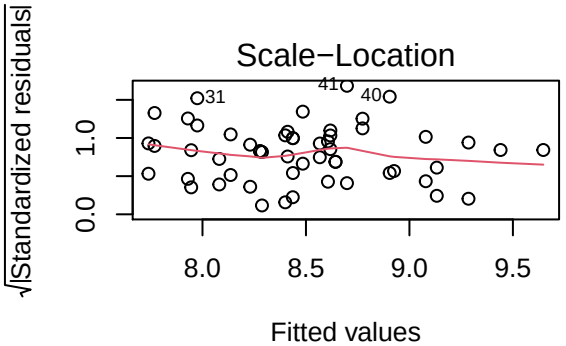


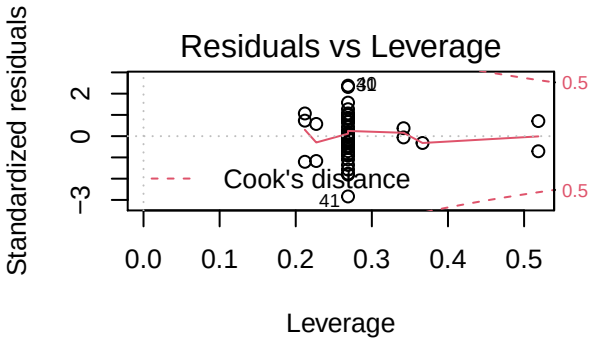



```
mod_group_sed_log= lm(log(plot_dat$Seedling.density....ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
plot(mod_group_sed_log)
```







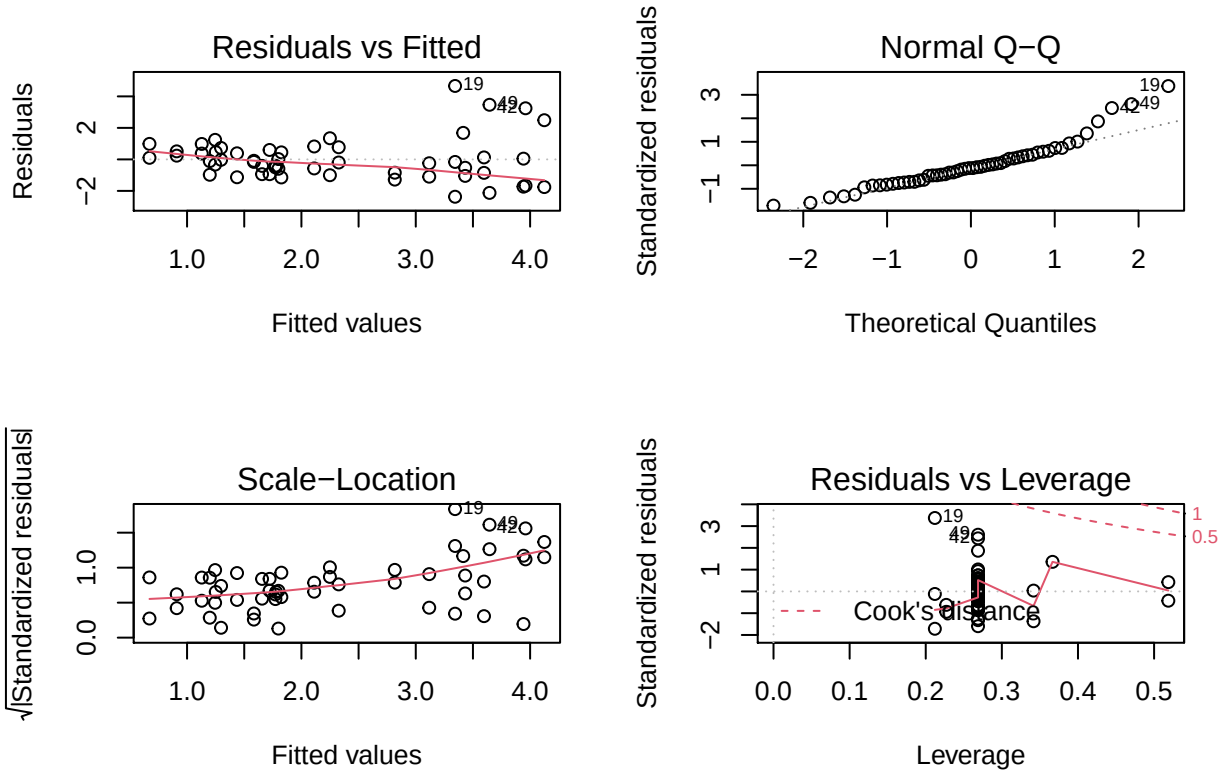


```
summary(mod_group_sed_log)
```

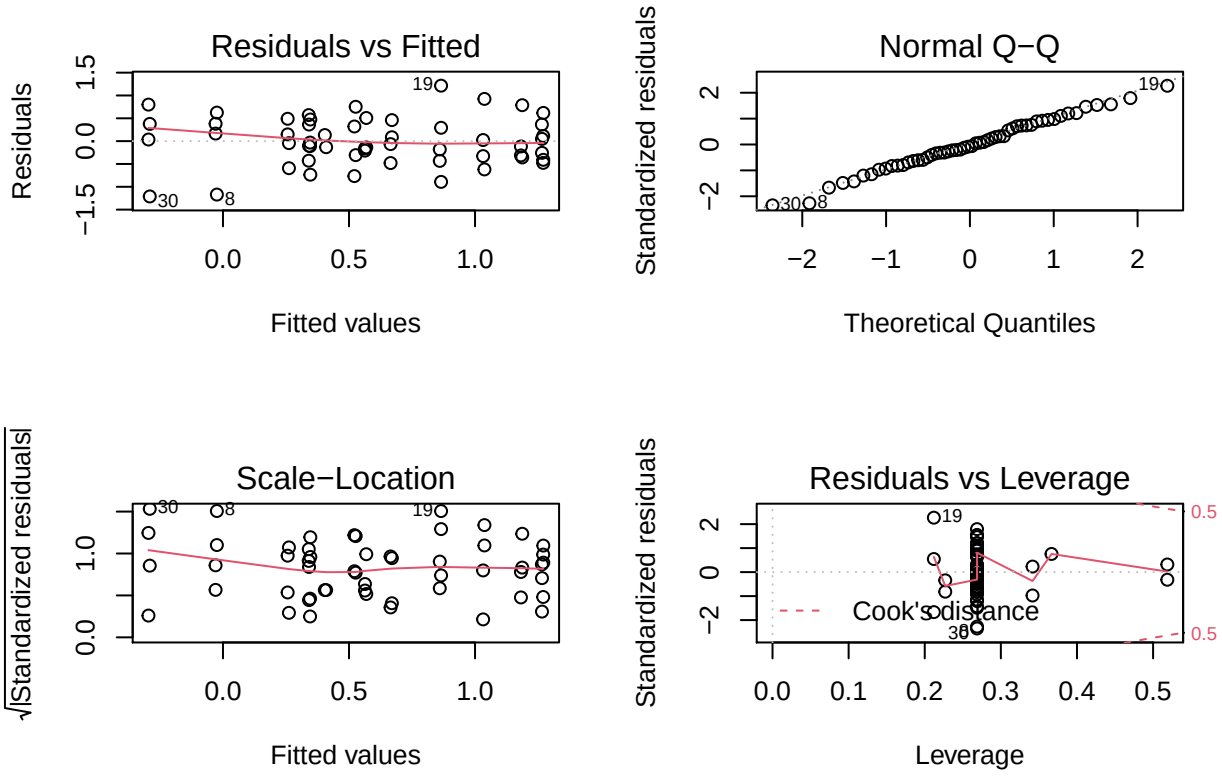
```
##
## Call:
## lm(formula = log(plot_dat$Seedling.density....ha.) ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.38487 -0.26881 -0.00895  0.33440  1.16017
##
## Coefficients:
##                                              Estimate Std. Error t value
## (Intercept)                                    7.5941     0.5007  15.168
## as.factor(plot_dat$Harvested)Yes              -0.2065     0.1562  -1.322
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No  0.4730     0.6994   0.676
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -0.2983     0.4038  -0.739
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  2.4727     0.6384   3.873
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  1.3105     0.4038   3.246
## as.factor(plot_dat$SoilType)BL, CHL              0.2204     0.5710   0.386
## as.factor(plot_dat$SoilType)CL                  -0.4703     0.4038  -1.165
## as.factor(plot_dat$SoilType)CL, KK               0.5757     0.5710   1.008
## as.factor(plot_dat$SoilType)CT                   0.6791     0.4038   1.682
## as.factor(plot_dat$SoilType)EK                   0.5259     0.4369   1.204
## as.factor(plot_dat$SoilType)EL, CHL              0.1670     0.4038   0.414
## as.factor(plot_dat$SoilType)KK                  -0.1217     0.4038  -0.301
## as.factor(plot_dat$SoilType)KK, BT              -1.1507     0.6257  -1.839
## as.factor(plot_dat$SoilType)KT                   1.1411     0.5710   1.998
##                                              Pr(>|t|)
## (Intercept)                                   < 2e-16 ***
## as.factor(plot_dat$Harvested)Yes             0.193829
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No  0.502815
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes 0.464491
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 0.000399 ***
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 0.002410 **
## as.factor(plot_dat$SoilType)BL, CHL             0.701652
## as.factor(plot_dat$SoilType)CL                  0.251158
## as.factor(plot_dat$SoilType)CL, KK              0.319610
## as.factor(plot_dat$SoilType)CT                  0.100613
## as.factor(plot_dat$SoilType)EK                  0.235945
## as.factor(plot_dat$SoilType)EL, CHL             0.681407
## as.factor(plot_dat$SoilType)KK                  0.764721
## as.factor(plot_dat$SoilType)KK, BT              0.073537 .
## as.factor(plot_dat$SoilType)KT                  0.052683 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.571 on 39 degrees of freedom
## Multiple R-squared:  0.4591, Adjusted R-squared:  0.2649
## F-statistic: 2.364 on 14 and 39 DF,  p-value: 0.0173
```

BA & size model: group 1:

```
mod_group_BA_1 = lm(plot_dat$BA_adult1.m2.ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_BA_1)
```




```
mod_group_BA_1_log = lm(log(plot_dat$BA_adult1.m2.ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_BA_1_log)
```



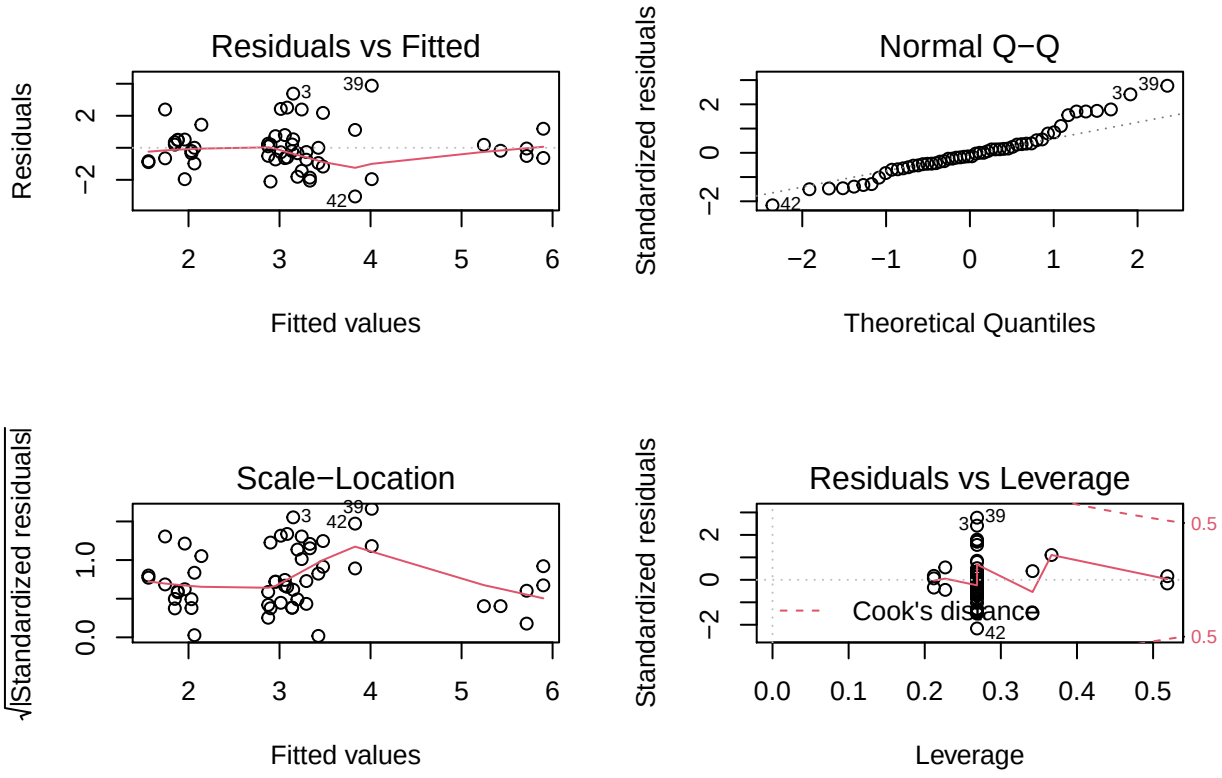

```
summary(mod_group_BA_1_log)
```

```
##
## Call:
## lm(formula = log(plot_dat$BA_adult1.m2.ha.) ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.21186 -0.32468 -0.03802  0.37375  1.21470
##
## Coefficients:
##                                                Estimate Std. Error t value
## (Intercept)                                     0.32841    0.52885   0.621
## as.factor(plot_dat$Harvested)Yes               -0.00517    0.16498  -0.031
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No  0.07698    0.73875   0.104
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -0.51715    0.42652  -1.212
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.74163    0.67439   1.100
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  0.85892    0.42652   2.014
## as.factor(plot_dat$SoilType)BL, CHL            -0.42956    0.60319  -0.712
## as.factor(plot_dat$SoilType)CL                  0.36713    0.42652   0.861
## as.factor(plot_dat$SoilType)CL, KK             -0.05983    0.60319  -0.099
## as.factor(plot_dat$SoilType)CT                 -0.10163    0.42652  -0.238
## as.factor(plot_dat$SoilType)EK                  0.60028    0.46151   1.301
## as.factor(plot_dat$SoilType)EL, CHL             0.60067    0.42652   1.408
## as.factor(plot_dat$SoilType)KK                 -0.14360    0.42652  -0.337
## as.factor(plot_dat$SoilType)KK, BT              0.31245    0.66097   0.473
```

```
## as.factor(plot_dat$SoilType)KT                  0.53537    0.60319   0.888
##                                                Pr(>|t|)
## (Intercept)                                       0.538
## as.factor(plot_dat$Harvested)Yes                  0.975
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No    0.918
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes   0.233
## as.factor(plot_dat$Forest.sAge..years.)10 to 15   0.278
## as.factor(plot_dat$Forest.sAge..years.)16 to 30   0.051 .
## as.factor(plot_dat$SoilType)BL, CHL               0.481
## as.factor(plot_dat$SoilType)CL                    0.395
## as.factor(plot_dat$SoilType)CL, KK                0.921
## as.factor(plot_dat$SoilType)CT                    0.813
## as.factor(plot_dat$SoilType)EK                    0.201
## as.factor(plot_dat$SoilType)EL, CHL               0.167
## as.factor(plot_dat$SoilType)KK                    0.738
## as.factor(plot_dat$SoilType)KK, BT                0.639
## as.factor(plot_dat$SoilType)KT                    0.380
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6032 on 39 degrees of freedom
## Multiple R-squared:  0.447,  Adjusted R-squared:  0.2485
## F-statistic: 2.252 on 14 and 39 DF,  p-value: 0.02316
```

group 2:

```
mod_group_BA_2 = lm(plot_dat$BA_adult2.m2.ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_BA_2)
```

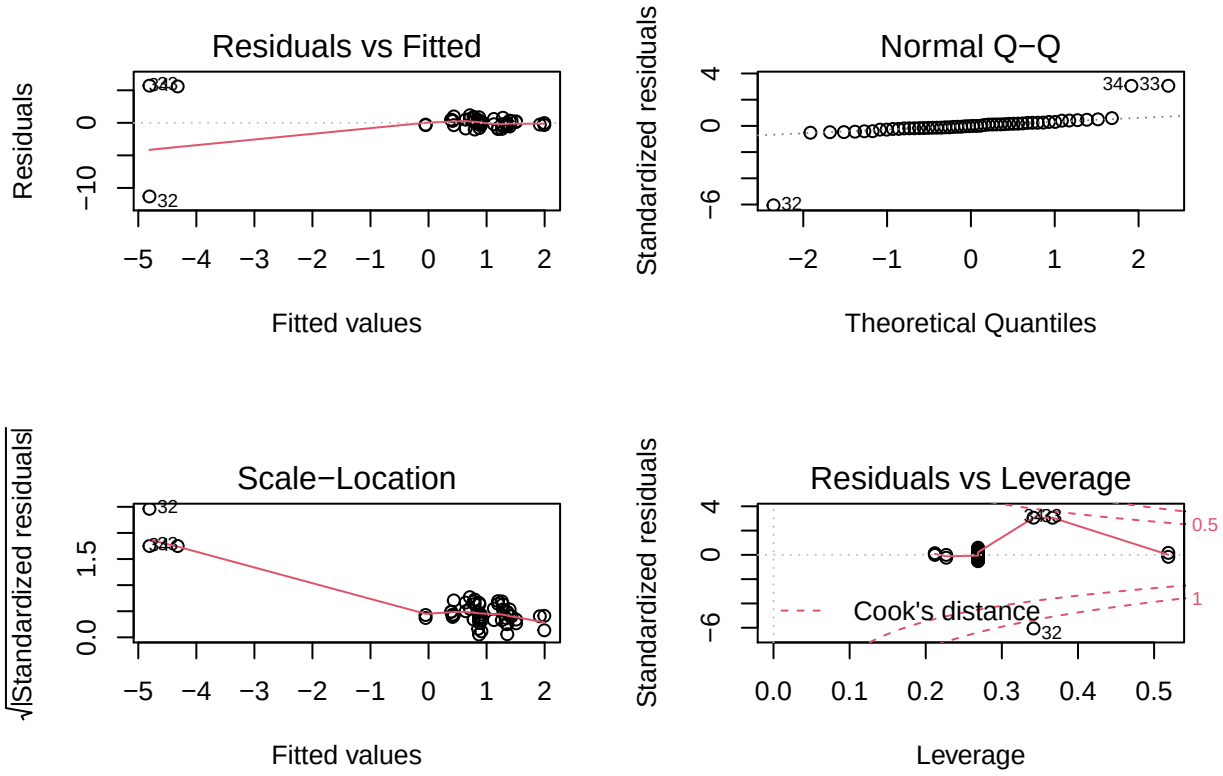



```
summary(mod_group_BA_2)
```

```
##
## Call:
## lm(formula = plot_dat$BA_adult2.m2.ha. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.0373 -0.7392 -0.1934  0.5120  3.8790
##
## Coefficients:
##                                                 Estimate Std. Error t value
## (Intercept)                                       2.1467     1.4379   1.493
## as.factor(plot_dat$Harvested)Yes                  0.1829     0.4486   0.408
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No   -0.5141     2.0086  -0.256
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes  -0.9293     1.1596  -0.801
## as.factor(plot_dat$Forest.sAge..years.)10 to 15   3.7785     1.8336   2.061
## as.factor(plot_dat$Forest.sAge..years.)16 to 30   1.6835     1.1596   1.452
## as.factor(plot_dat$SoilType)BL, CHL               0.2170     1.6400   0.132
## as.factor(plot_dat$SoilType)CL                    0.3940     1.1596   0.340
## as.factor(plot_dat$SoilType)CL, KK                1.3815     1.6400   0.842
## as.factor(plot_dat$SoilType)CT                    0.3427     1.1596   0.296
## as.factor(plot_dat$SoilType)EK                   -0.9424     1.2548  -0.751
## as.factor(plot_dat$SoilType)EL, CHL               2.8142     1.1596   2.427
## as.factor(plot_dat$SoilType)KK                    0.2495     1.1596   0.215
## as.factor(plot_dat$SoilType)KK, BT               -2.1204     1.7971  -1.180
```

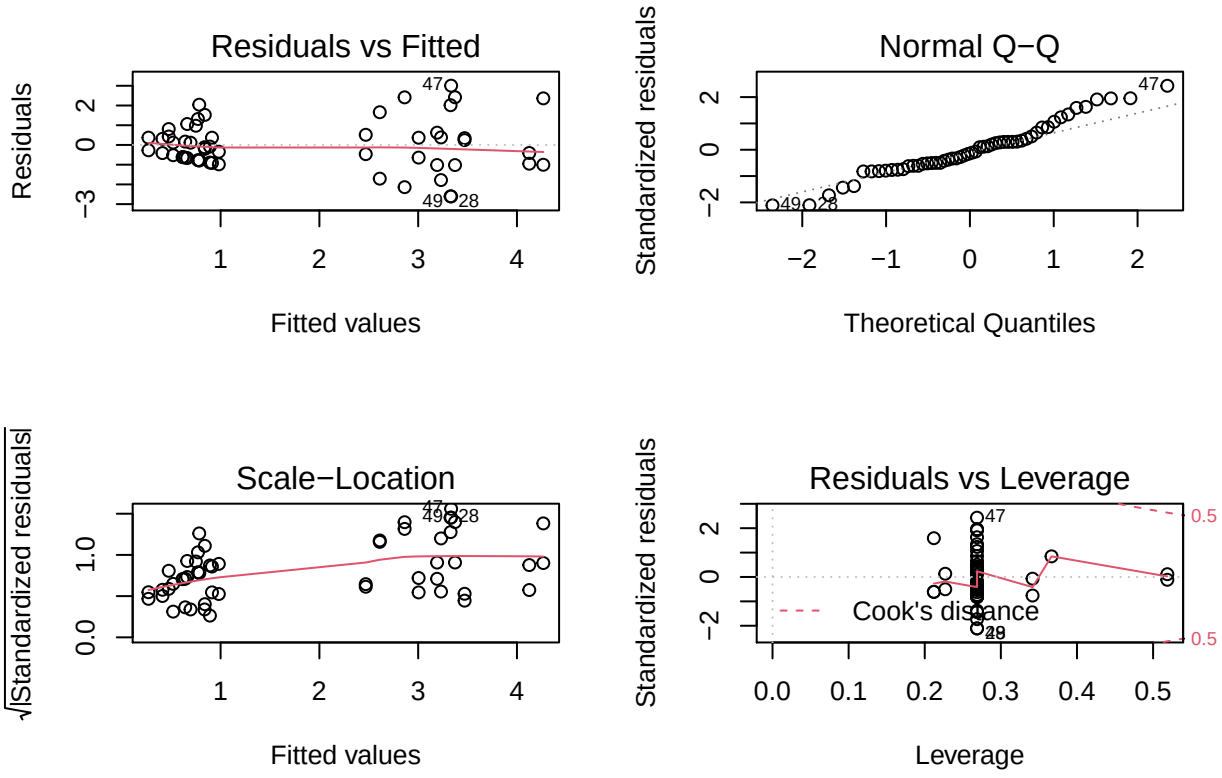
```
## as.factor(plot_dat$SoilType)KT                   1.7379     1.6400   1.060
##                                                Pr(>|t|)
## (Intercept)                                       0.143
## as.factor(plot_dat$Harvested)Yes                  0.686
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No    0.799
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes   0.428
## as.factor(plot_dat$Forest.sAge..years.)10 to 15   0.046 *
## as.factor(plot_dat$Forest.sAge..years.)16 to 30   0.155
## as.factor(plot_dat$SoilType)BL, CHL               0.895
## as.factor(plot_dat$SoilType)CL                    0.736
## as.factor(plot_dat$SoilType)CL, KK                0.405
## as.factor(plot_dat$SoilType)CT                    0.769
## as.factor(plot_dat$SoilType)EK                    0.457
## as.factor(plot_dat$SoilType)EL, CHL               0.020 *
## as.factor(plot_dat$SoilType)KK                    0.831
## as.factor(plot_dat$SoilType)KK, BT                0.245
## as.factor(plot_dat$SoilType)KT                    0.296
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.64 on 39 degrees of freedom
## Multiple R-squared:  0.3846, Adjusted R-squared:  0.1637
## F-statistic: 1.741 on 14 and 39 DF,  p-value: 0.0863
```

```
plot_dat$BA_adult2.m2.ha.[plot_dat$BA_adult2.m2.ha. == 0] <-  10^-7
mod_group_BA_2_log = lm(log(plot_dat$BA_adult2.m2.ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_BA_2_log)
```



group 3:

```
mod_group_BA_3 = lm(plot_dat$BA_adult3.m2.ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_BA_3)
```

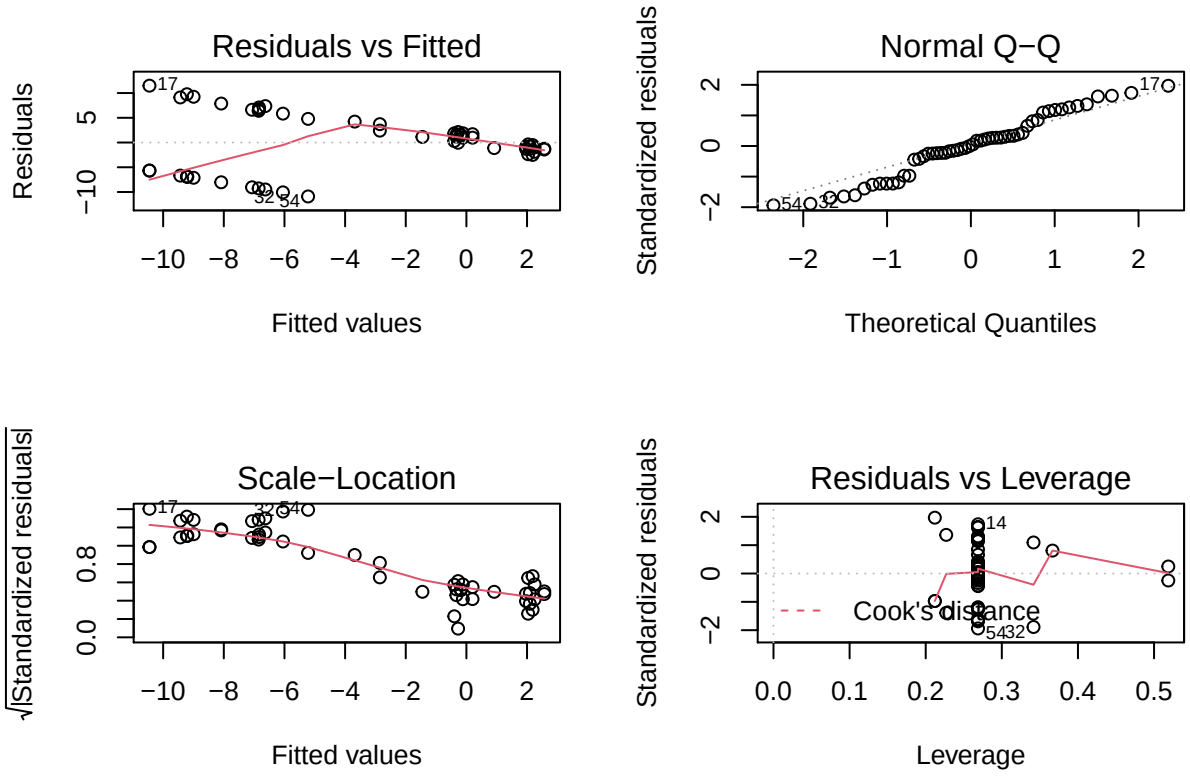



```
summary(mod_group_BA_3)
```

```
##
## Call:
## lm(formula = plot_dat$BA_adult3.m2.ha. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.6106 -0.7805 -0.1573  0.4933  3.0053
##
## Coefficients:
##                                                Estimate Std. Error t value
## (Intercept)                                     3.97080    1.26758   3.133
## as.factor(plot_dat$Harvested)Yes               -0.14192    0.39544  -0.359
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No -5.33132    1.77069  -3.011
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes  0.06942    1.02231   0.068
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 -5.22501    1.61641  -3.232
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 -3.05808    1.02231  -2.991
## as.factor(plot_dat$SoilType)BL, CHL             1.97743    1.44576   1.368
## as.factor(plot_dat$SoilType)CL                  2.35141    1.02231   2.300
## as.factor(plot_dat$SoilType)CL, KK              4.73346    1.44576   3.274
## as.factor(plot_dat$SoilType)CT                 -0.57034    1.02231  -0.558
## as.factor(plot_dat$SoilType)EK                 -0.09015    1.10618  -0.081
## as.factor(plot_dat$SoilType)EL, CHL             1.62910    1.02231   1.594
## as.factor(plot_dat$SoilType)KK                  2.02246    1.02231   1.978
## as.factor(plot_dat$SoilType)KK, BT              1.96850    1.58425   1.243
```

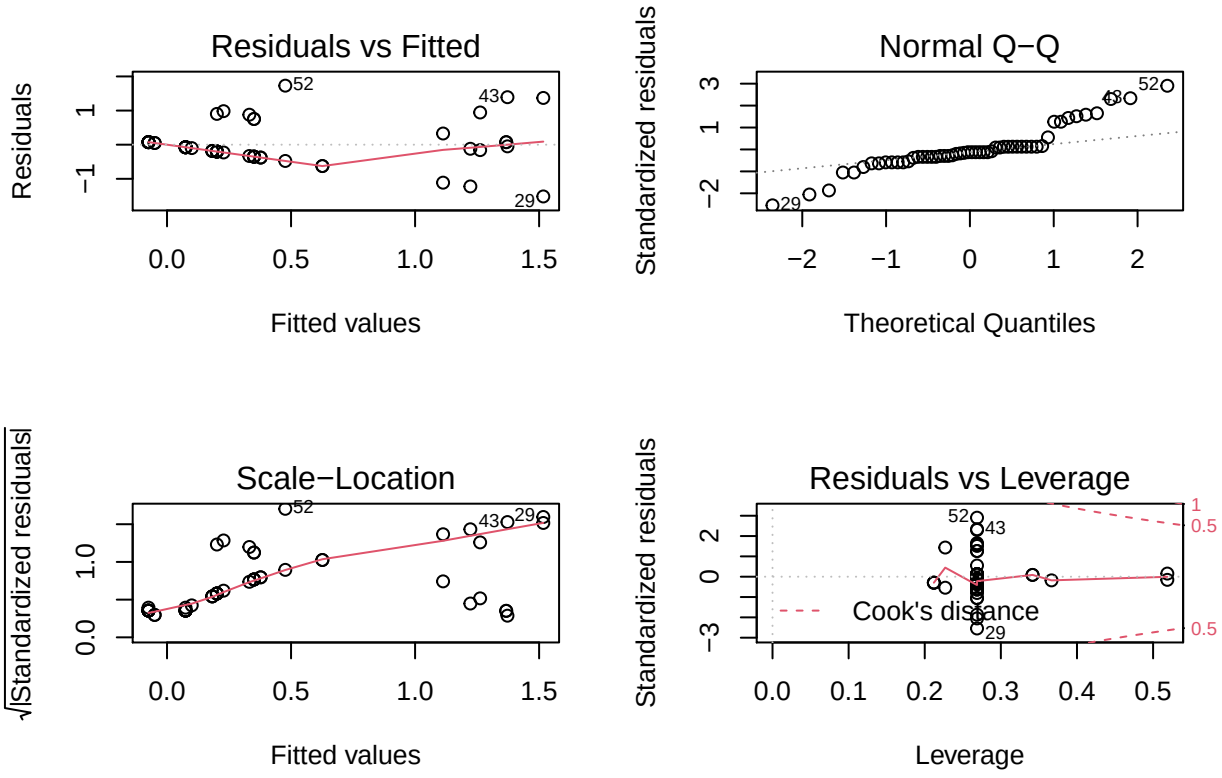
```
## as.factor(plot_dat$SoilType)KT                   0.22639    1.44576   0.157
##                                                 Pr(>|t|)
## (Intercept)                                      0.00328 **
## as.factor(plot_dat$Harvested)Yes                 0.72161
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No   0.00455 **
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes  0.94621
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.00250 **
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  0.00480 **
## as.factor(plot_dat$SoilType)BL, CHL              0.17922
## as.factor(plot_dat$SoilType)CL                   0.02688 *
## as.factor(plot_dat$SoilType)CL, KK               0.00223 **
## as.factor(plot_dat$SoilType)CT                   0.58010
## as.factor(plot_dat$SoilType)EK                   0.93546
## as.factor(plot_dat$SoilType)EL, CHL              0.11911
## as.factor(plot_dat$SoilType)KK                   0.05499 .
## as.factor(plot_dat$SoilType)KK, BT               0.22146
## as.factor(plot_dat$SoilType)KT                   0.87638
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.446 on 39 degrees of freedom
## Multiple R-squared:  0.5418, Adjusted R-squared:  0.3774
## F-statistic: 3.295 on 14 and 39 DF,  p-value: 0.001637
```

```
plot_dat$BA_adult3.m2.ha.[plot_dat$BA_adult3.m2.ha. == 0] <- 10^-7
mod_group_BA_3_log = lm(log(plot_dat$BA_adult3.m2.ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_BA_3_log)
```



group 4:

```
mod_group_BA_4 = lm(plot_dat$BA_adult4.m2.ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_BA_4)
```

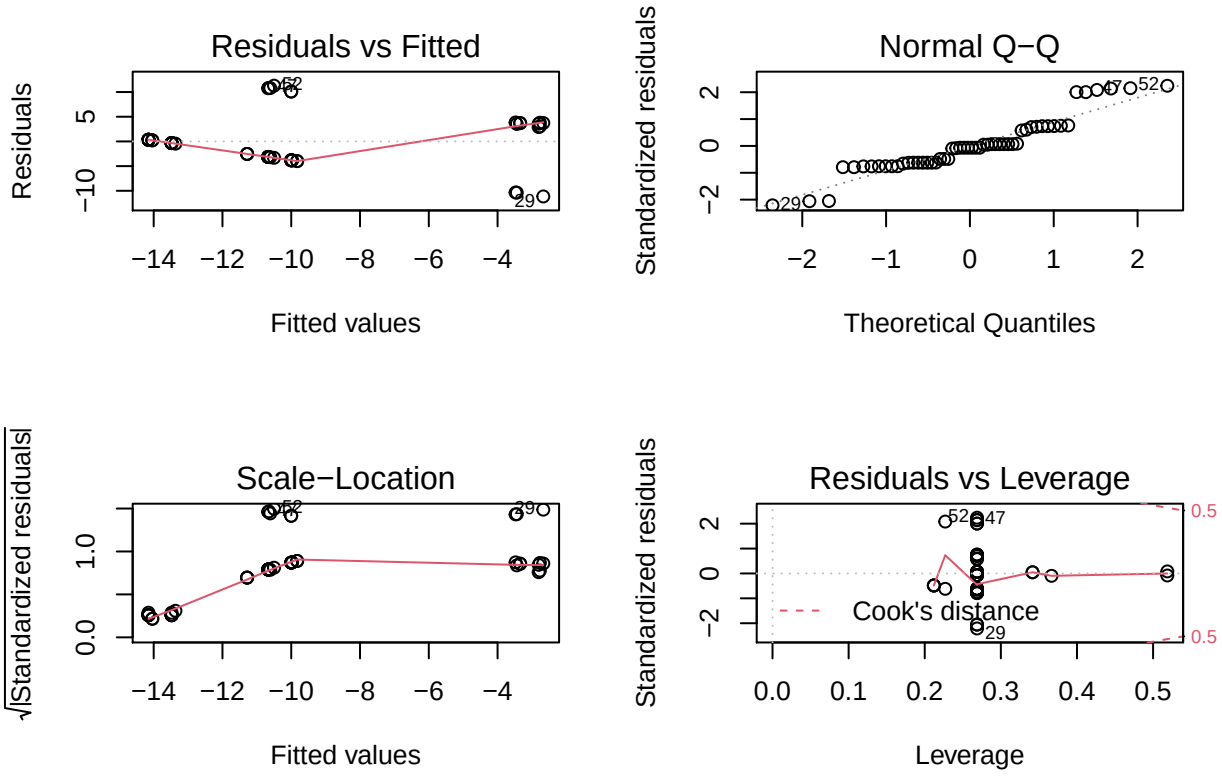



```
summary(mod_group_BA_4)
```

```
##
## Call:
## lm(formula = plot_dat$BA_adult4.m2.ha. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.51687 -0.22120 -0.07475  0.07475  1.72950
##
## Coefficients:
##                                                  Estimate Std. Error t value
## (Intercept)                                     1.643e+00  6.107e-01   2.691
## as.factor(plot_dat$Harvested)Yes                1.495e-01  1.905e-01   0.785
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No -1.442e+00  8.531e-01  -1.690
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes 2.758e-01  4.925e-01   0.560
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 -1.718e+00  7.788e-01  -2.206
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 -1.442e+00  4.925e-01  -2.928
## as.factor(plot_dat$SoilType)BL, CHL              9.254e-16  6.965e-01   0.000
## as.factor(plot_dat$SoilType)CL                  -2.489e-01  4.925e-01  -0.505
## as.factor(plot_dat$SoilType)CL, KK               1.022e+00  6.965e-01   1.467
## as.factor(plot_dat$SoilType)CT                  -5.516e-01  4.925e-01  -1.120
## as.factor(plot_dat$SoilType)EK                  -5.267e-01  5.329e-01  -0.988
## as.factor(plot_dat$SoilType)EL, CHL             -5.516e-01  4.925e-01  -1.120
## as.factor(plot_dat$SoilType)KK                  -2.758e-01  4.925e-01  -0.560
## as.factor(plot_dat$SoilType)KK, BT              -1.869e-02  7.633e-01  -0.024
```

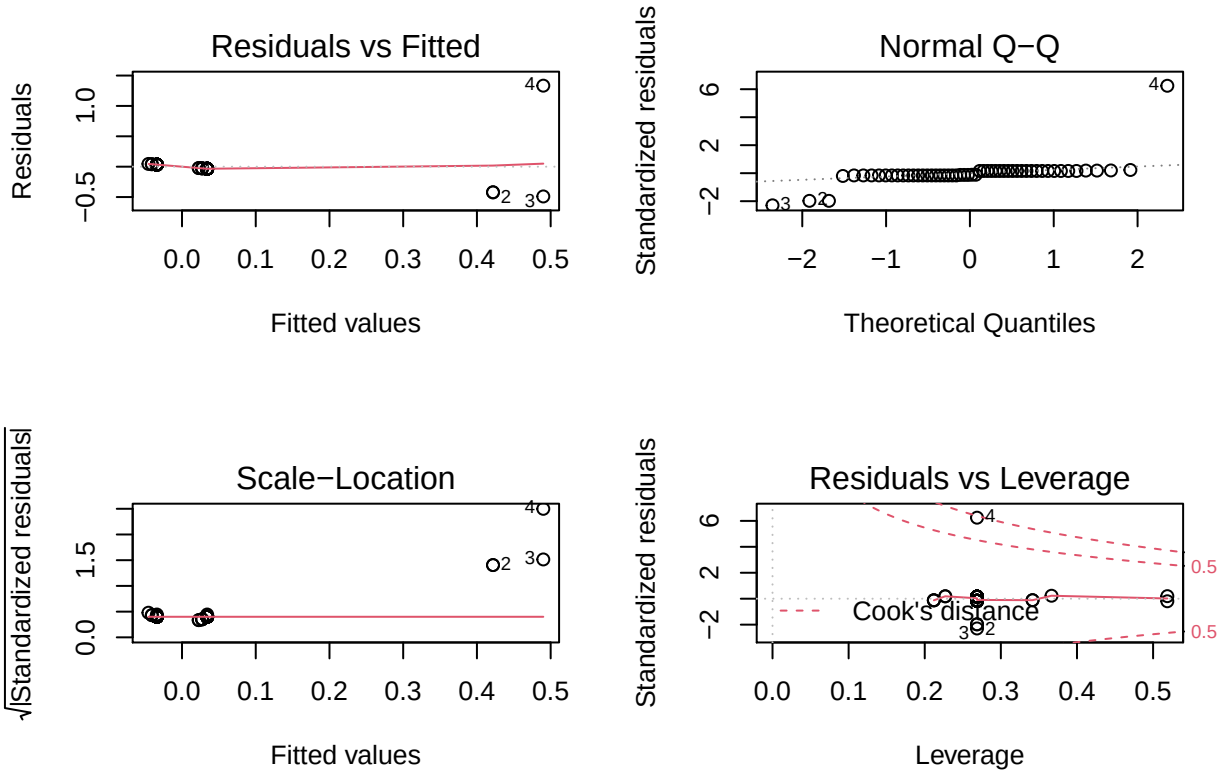
```
## as.factor(plot_dat$SoilType)KT                 -8.061e-01  6.965e-01  -1.157
##                                                Pr(>|t|)
## (Intercept)                                     0.01045 *
## as.factor(plot_dat$Harvested)Yes                0.43734
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No  0.09892 .
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes 0.57872
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 0.03335 *
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 0.00567 **
## as.factor(plot_dat$SoilType)BL, CHL             1.00000
## as.factor(plot_dat$SoilType)CL                  0.61616
## as.factor(plot_dat$SoilType)CL, KK              0.15038
## as.factor(plot_dat$SoilType)CT                  0.26961
## as.factor(plot_dat$SoilType)EK                  0.32913
## as.factor(plot_dat$SoilType)EL, CHL             0.26961
## as.factor(plot_dat$SoilType)KK                  0.57872
## as.factor(plot_dat$SoilType)KK, BT              0.98058
## as.factor(plot_dat$SoilType)KT                  0.25419
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6965 on 39 degrees of freedom
## Multiple R-squared:  0.4151, Adjusted R-squared:  0.2052
## F-statistic: 1.977 on 14 and 39 DF,  p-value: 0.04717
```

```
plot_dat$BA_adult4.m2.ha.[plot_dat$BA_adult4.m2.ha. == 0] <-  0.000001
mod_group_BA_4_log = lm(log(plot_dat$BA_adult4.m2.ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_BA_4_log)
```



group 5:

```
mod_group_BA_5 = lm(plot_dat$BA_adult5.m2.ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
par(mfrow = c(2,2))
plot(mod_group_BA_5)
```



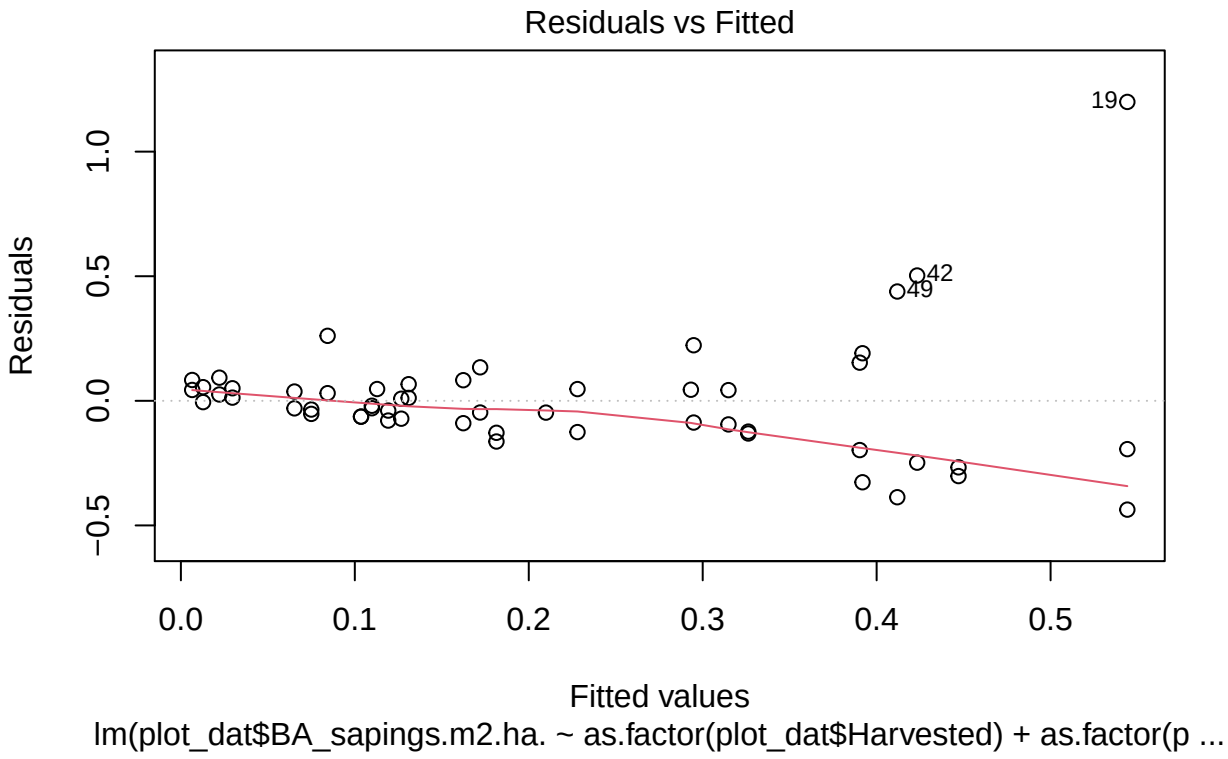

```
summary(mod_group_BA_5)
```

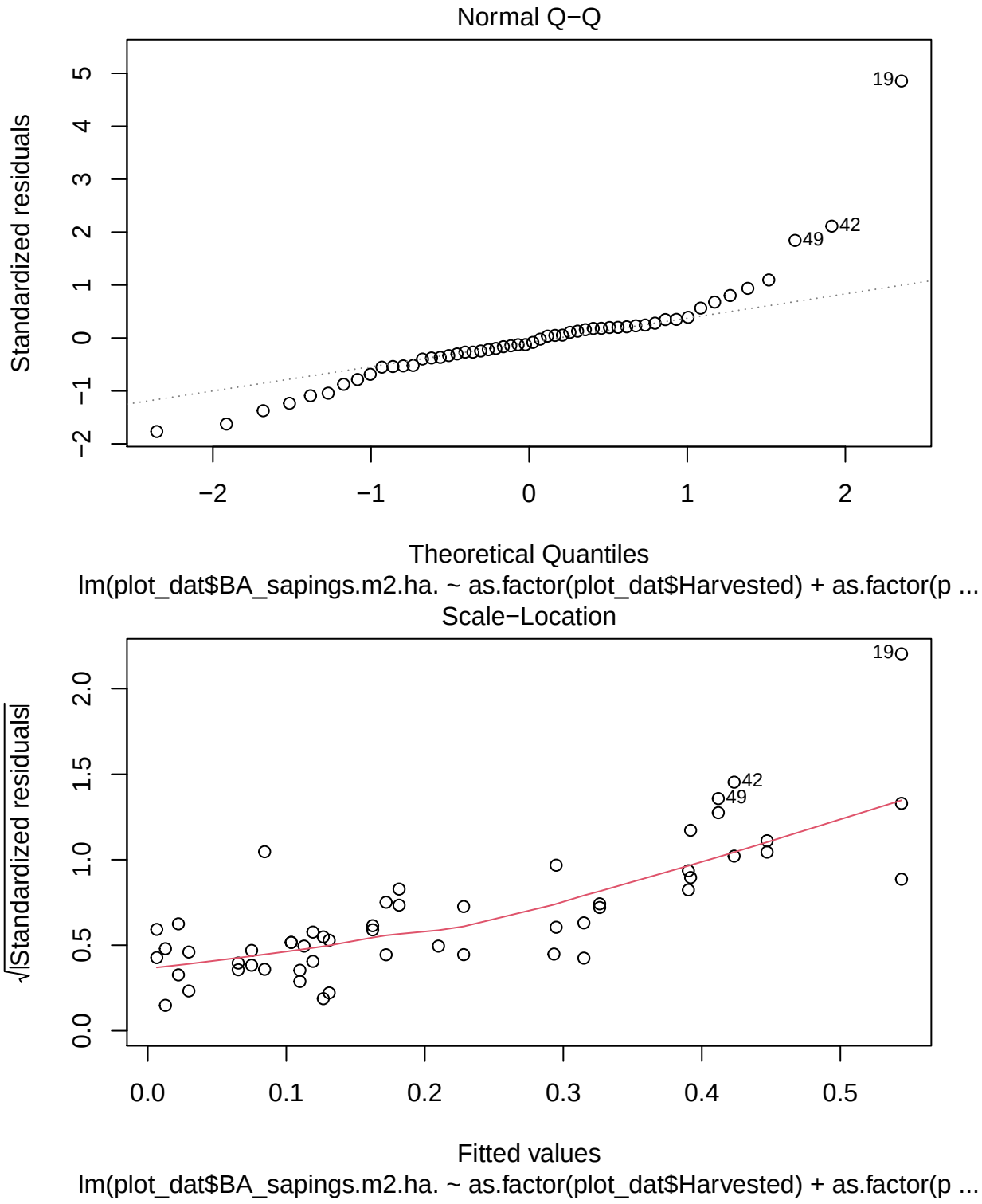
```
##
## Call:
## lm(formula = plot_dat$BA_adult5.m2.ha. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.49001 -0.03411 -0.02501  0.03411  1.33359
##
## Coefficients:
##                                                  Estimate Std. Error t value
## (Intercept)                                     3.411e-02  2.189e-01   0.156
## as.factor(plot_dat$Harvested)Yes                -6.821e-02  6.830e-02  -0.999
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No  -4.559e-01  3.058e-01  -1.491
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -3.940e-16  1.766e-01   0.000
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 -4.559e-01  2.792e-01  -1.633
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 -1.785e-16  1.766e-01   0.000
## as.factor(plot_dat$SoilType)BL, CHL              4.559e-01  2.497e-01   1.826
## as.factor(plot_dat$SoilType)CL                  -3.072e-16  1.766e-01   0.000
## as.factor(plot_dat$SoilType)CL, KK               4.559e-01  2.497e-01   1.826
## as.factor(plot_dat$SoilType)CT                  -4.583e-16  1.766e-01   0.000
## as.factor(plot_dat$SoilType)EK                  -1.137e-02  1.911e-01  -0.060
## as.factor(plot_dat$SoilType)EL, CHL             -1.990e-16  1.766e-01   0.000
## as.factor(plot_dat$SoilType)KK                   4.559e-01  1.766e-01   2.582
## as.factor(plot_dat$SoilType)KK, BT               4.491e-01  2.736e-01   1.641
```

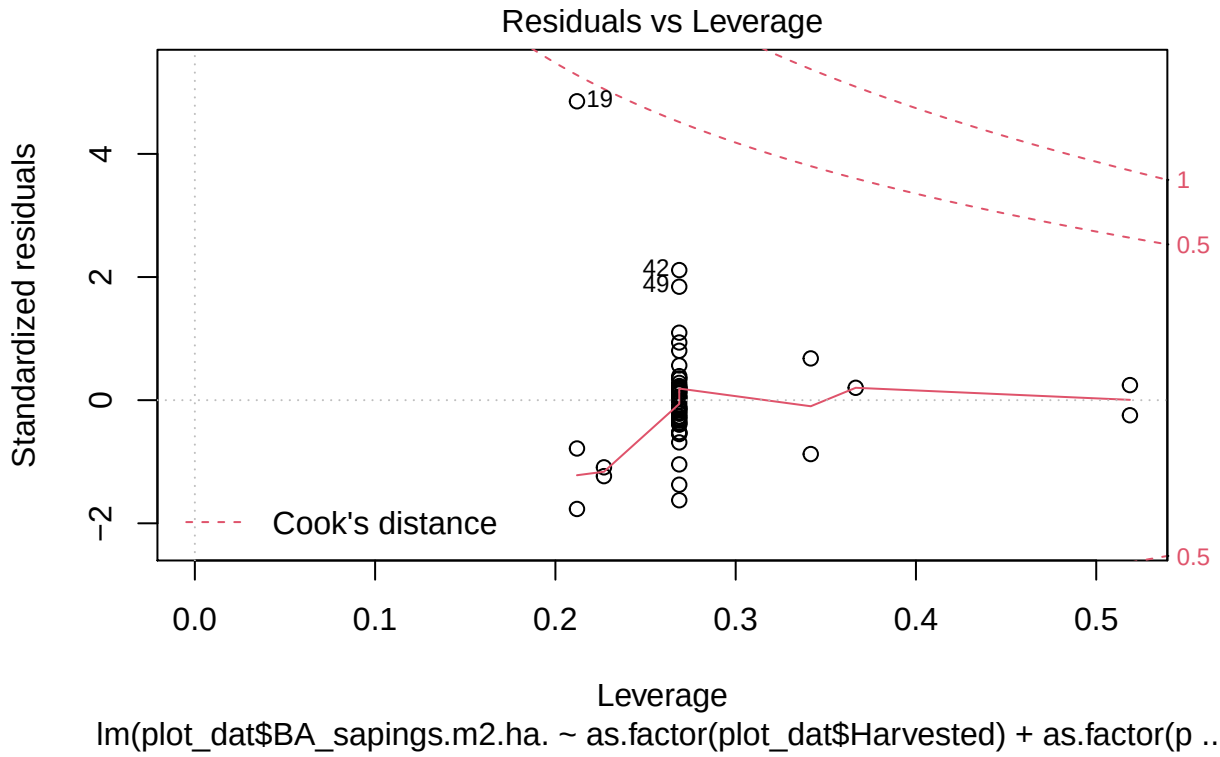
```
## as.factor(plot_dat$SoilType)KT                 -4.996e-16  2.497e-01   0.000
##                                                Pr(>|t|)
## (Intercept)                                      0.8770
## as.factor(plot_dat$Harvested)Yes                 0.3241
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No   0.1441
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes  1.0000
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.1105
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  1.0000
## as.factor(plot_dat$SoilType)BL, CHL              0.0756 .
## as.factor(plot_dat$SoilType)CL                   1.0000
## as.factor(plot_dat$SoilType)CL, KK               0.0756 .
## as.factor(plot_dat$SoilType)CT                   1.0000
## as.factor(plot_dat$SoilType)EK                   0.9529
## as.factor(plot_dat$SoilType)EL, CHL              1.0000
## as.factor(plot_dat$SoilType)KK                   0.0137 *
## as.factor(plot_dat$SoilType)KK, BT               0.1088
## as.factor(plot_dat$SoilType)KT                   1.0000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2497 on 39 degrees of freedom
## Multiple R-squared:  0.2549, Adjusted R-squared:  -0.01256
## F-statistic: 0.953 on 14 and 39 DF,  p-value: 0.5151
```

saplings:

```
mod_group_BA_sap = lm(plot_dat$BA_sapings.m2.ha. ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
plot(mod_group_BA_sap)
```




Normal Q−Q
Standardized residuals
Theoretical Quantiles
lm(plot_dat$BA_sapings.m2.ha. ~ as.factor(plot_dat$Harvested) + as.factor(p ...
Scale−Location
√|Standardized residuals|
Fitted values
lm(plot_dat$BA_sapings.m2.ha. ~ as.factor(plot_dat$Harvested) + as.factor(p ...
19
42
49

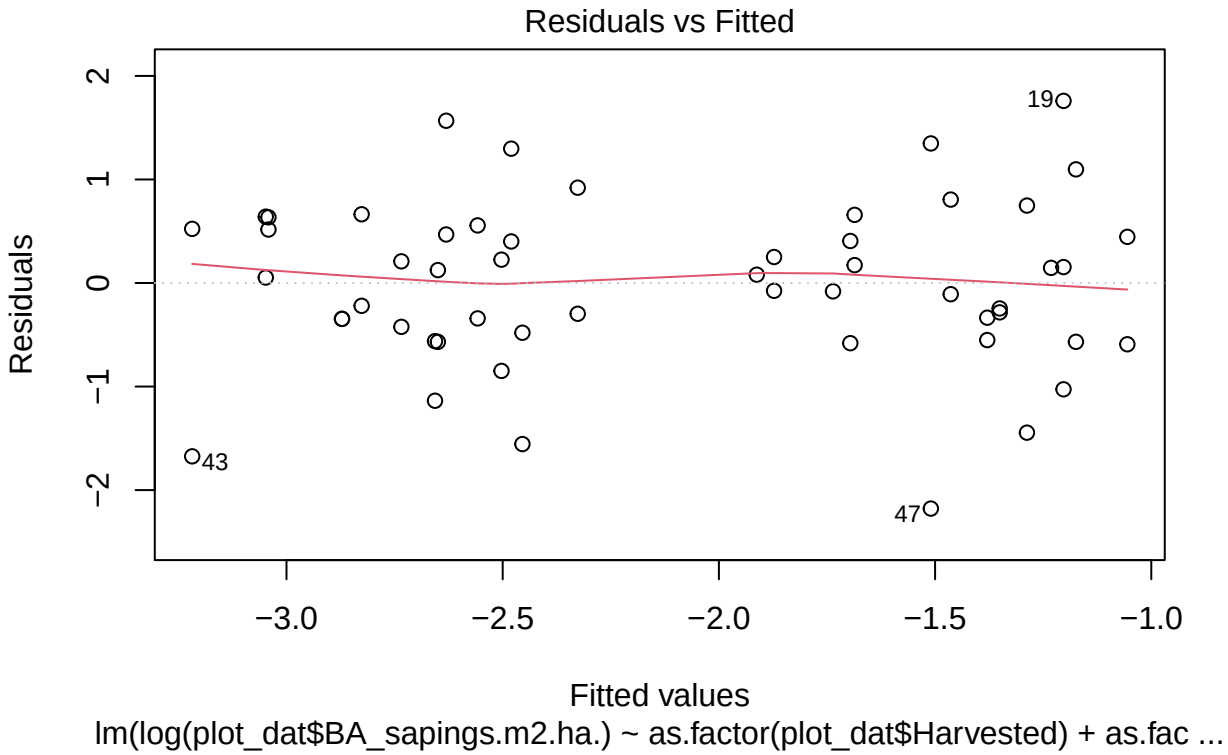


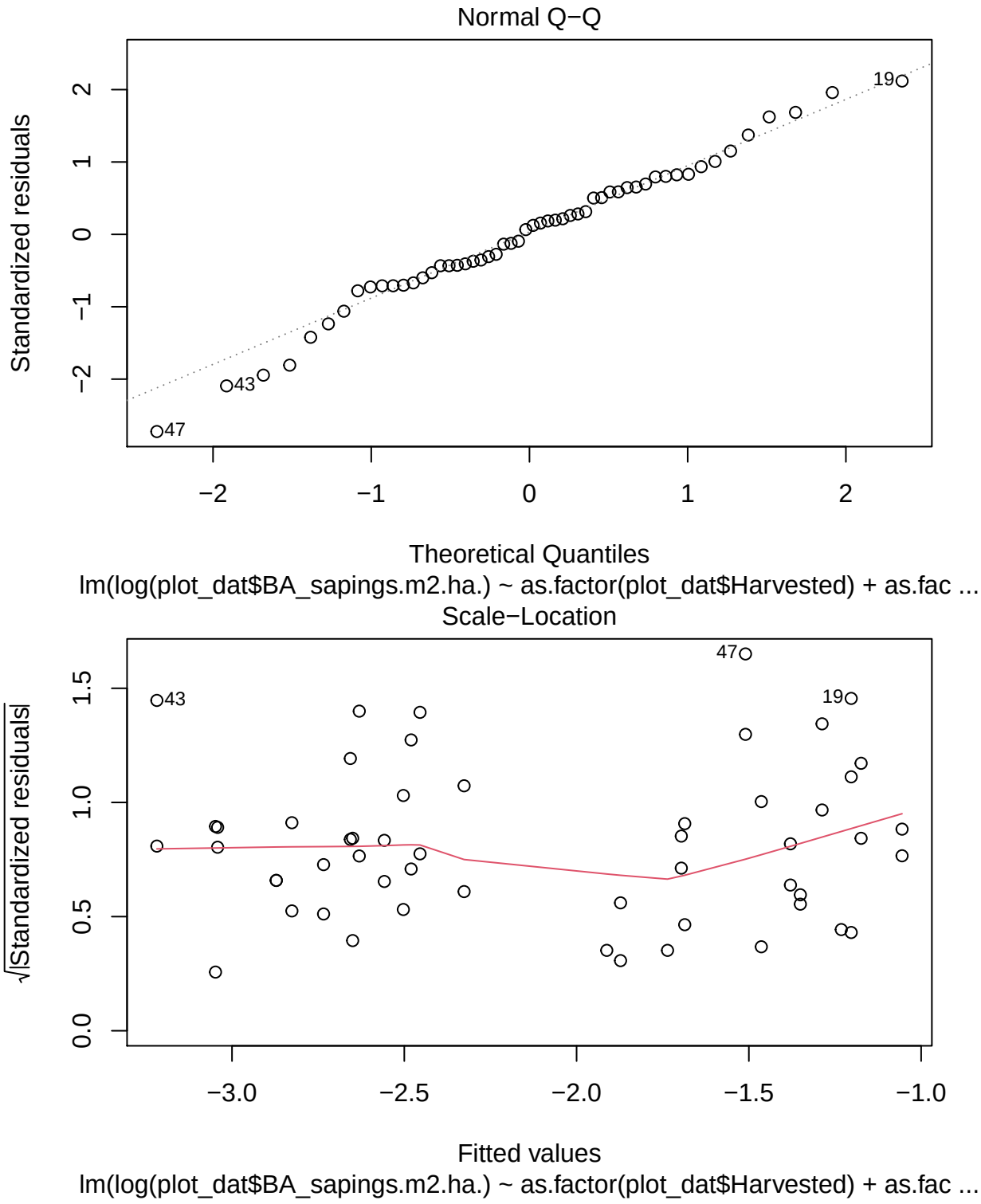

```
summary(mod_group_BA_sap)
```

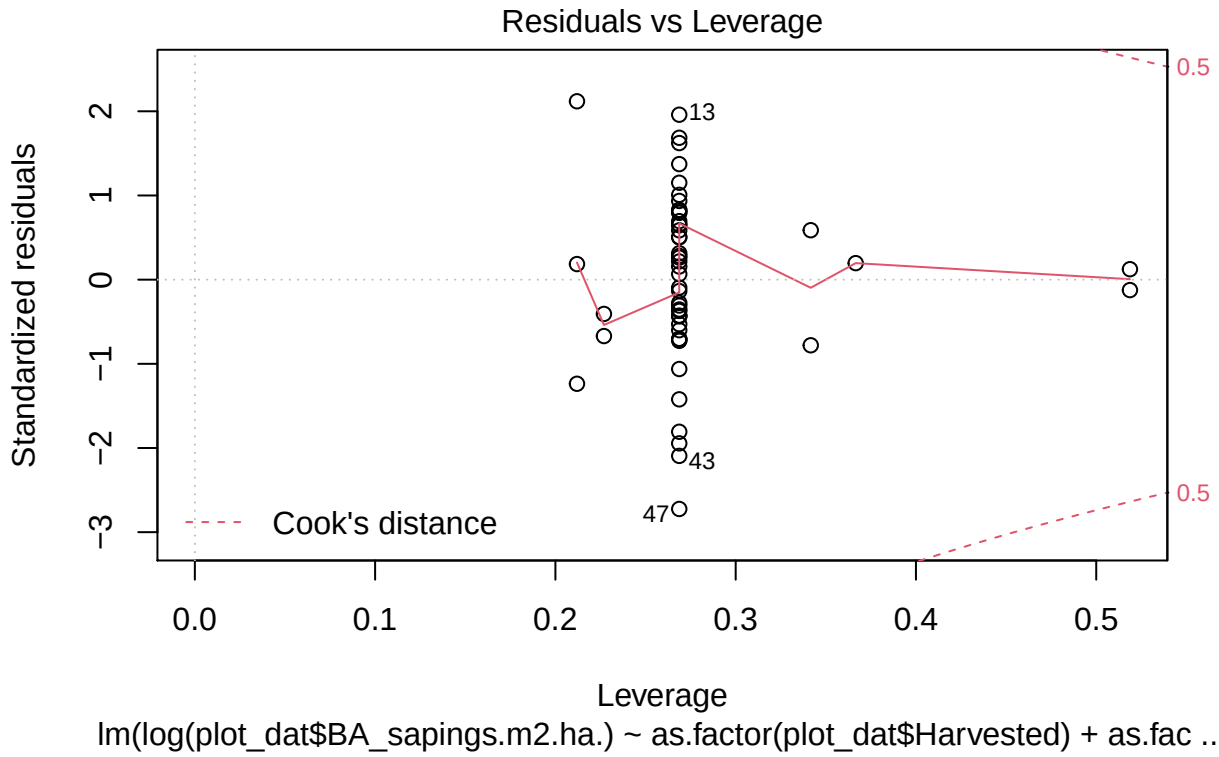
```
##
## Call:
## lm(formula = plot_dat$BA_sapings.m2.ha. ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.43657 -0.09346 -0.02477  0.04963  1.19941
##
## Coefficients:
##                                                Estimate Std. Error t value
## (Intercept)                                     0.35481    0.24402   1.454
## as.factor(plot_dat$Harvested)Yes               -0.09707    0.07613  -1.275
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No -0.10772    0.34087  -0.316
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -0.19527    0.19680  -0.992
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.11601    0.31117   0.373
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  0.06848    0.19680   0.348
## as.factor(plot_dat$SoilType)BL, CHL            -0.12038    0.27832  -0.433
## as.factor(plot_dat$SoilType)CL                  0.18386    0.19680   0.934
## as.factor(plot_dat$SoilType)CL, KK             -0.13727    0.27832  -0.493
## as.factor(plot_dat$SoilType)CT                 -0.05597    0.19680  -0.284
## as.factor(plot_dat$SoilType)EK                  0.16226    0.21295   0.762
## as.factor(plot_dat$SoilType)EL, CHL             0.16385    0.19680   0.833
## as.factor(plot_dat$SoilType)KK                 -0.06566    0.19680  -0.334
## as.factor(plot_dat$SoilType)KK, BT              0.26858    0.30498   0.881
## as.factor(plot_dat$SoilType)KT                 -0.04034    0.27832  -0.145
```

```
##                                                Pr(>|t|)
## (Intercept)                                       0.154
## as.factor(plot_dat$Harvested)Yes                  0.210
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No    0.754
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes   0.327
## as.factor(plot_dat$Forest.sAge..years.)10 to 15   0.711
## as.factor(plot_dat$Forest.sAge..years.)16 to 30   0.730
## as.factor(plot_dat$SoilType)BL, CHL               0.668
## as.factor(plot_dat$SoilType)CL                    0.356
## as.factor(plot_dat$SoilType)CL, KK                0.625
## as.factor(plot_dat$SoilType)CT                    0.778
## as.factor(plot_dat$SoilType)EK                    0.451
## as.factor(plot_dat$SoilType)EL, CHL               0.410
## as.factor(plot_dat$SoilType)KK                    0.740
## as.factor(plot_dat$SoilType)KK, BT                0.384
## as.factor(plot_dat$SoilType)KT                    0.886
##
## Residual standard error: 0.2783 on 39 degrees of freedom
## Multiple R-squared:  0.3059, Adjusted R-squared:  0.0568
## F-statistic: 1.228 on 14 and 39 DF,  p-value: 0.2953
```

```
mod_group_BA_sap_log = lm(log(plot_dat$BA_sapings.m2.ha.) ~ as.factor(plot_dat$Harvested) +
            as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
            as.factor(plot_dat$SoilType), data = plot_dat)
plot(mod_group_BA_sap_log)
```




Normal Q−Q
Standardized residuals
Theoretical Quantiles
lm(log(plot_dat$BA_sapings.m2.ha.) ~ as.factor(plot_dat$Harvested) + as.fac ...
Scale−Location
√|Standardized residuals|
Fitted values
lm(log(plot_dat$BA_sapings.m2.ha.) ~ as.factor(plot_dat$Harvested) + as.fac ...




```
summary(mod_group_BA_sap_log)
```

```
##
## Call:
## lm(formula = log(plot_dat$BA_sapings.m2.ha.) ~ as.factor(plot_dat$Harvested) +
##     as.factor(plot_dat$Milpa.has.it.been.milpa.) + as.factor(plot_dat$Forest.sAge..years.) +
##     as.factor(plot_dat$SoilType), data = plot_dat)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.1785 -0.4659  0.0666  0.5215  1.7589
##
## Coefficients:
##                                                Estimate Std. Error t value
## (Intercept)                                    -1.56562    0.81990  -1.910
## as.factor(plot_dat$Harvested)Yes               -0.17633    0.25578  -0.689
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No -0.25835    1.14532  -0.226
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes -0.52182    0.66125  -0.789
## as.factor(plot_dat$Forest.sAge..years.)10 to 15  0.98179    1.04553   0.939
## as.factor(plot_dat$Forest.sAge..years.)16 to 30  0.39138    0.66125   0.592
## as.factor(plot_dat$SoilType)BL, CHL            -0.73398    0.93515  -0.785
## as.factor(plot_dat$SoilType)CL                  0.18629    0.66125   0.282
## as.factor(plot_dat$SoilType)CL, KK             -1.21780    0.93515  -1.302
## as.factor(plot_dat$SoilType)CT                 -0.78415    0.66125  -1.186
## as.factor(plot_dat$SoilType)EK                  0.64068    0.71550   0.895
## as.factor(plot_dat$SoilType)EL, CHL             0.40854    0.66125   0.618
## as.factor(plot_dat$SoilType)KK                 -0.63041    0.66125  -0.953
## as.factor(plot_dat$SoilType)KK, BT             -0.09734    1.02473  -0.095
## as.factor(plot_dat$SoilType)KT                 -0.56241    0.93515  -0.601
```

```
##                                              Pr(>|t|)
## (Intercept)                                    0.0636 .
## as.factor(plot_dat$Harvested)Yes               0.4947
## as.factor(plot_dat$Milpa.has.it.been.milpa.)No 0.8227
## as.factor(plot_dat$Milpa.has.it.been.milpa.)Yes 0.4348
## as.factor(plot_dat$Forest.sAge..years.)10 to 15 0.3535
## as.factor(plot_dat$Forest.sAge..years.)16 to 30 0.5573
## as.factor(plot_dat$SoilType)BL, CHL            0.4373
## as.factor(plot_dat$SoilType)CL                 0.7796
## as.factor(plot_dat$SoilType)CL, KK             0.2005
## as.factor(plot_dat$SoilType)CT                 0.2429
## as.factor(plot_dat$SoilType)EK                 0.3761
## as.factor(plot_dat$SoilType)EL, CHL            0.5403
## as.factor(plot_dat$SoilType)KK                 0.3463
## as.factor(plot_dat$SoilType)KK, BT             0.9248
## as.factor(plot_dat$SoilType)KT                 0.5510
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9352 on 39 degrees of freedom
## Multiple R-squared:  0.4258, Adjusted R-squared:  0.2196
## F-statistic: 2.066 on 14 and 39 DF,  p-value: 0.03754
```