

Estudio de reflectividad en campos de agave: tratamiento inicial

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Cargar bibliotecas necesarias

```
library(foreign)
```

```
## Warning: package 'foreign' was built under R version 3.3.2
```

Cargar las tablas con datos de muestreo de imagenes 2013, 2014, 2015

```
mydata2013<-read.dbf("Clip_PunRas_Buffer_45m_inters_2013.dbf")
mydata2013[mydata2013["FECH_SIEM"] == 0,"FECH_SIEM"] <- NA # sustituir fecha de siembra 0 por NA

mydata2014<-read.dbf("Clip_punRas_Buffer_45m_intersec_2014.dbf")
mydata2014[mydata2014["FECH_SIEM"] == 0,"FECH_SIEM"] <- NA # sustituir fecha de siembra 0 por NA

mydata2015<-read.dbf("Clip_punRas_Buffer_45m_intersec_2015.dbf")
mydata2015[mydata2015["FECH_SIEM"] == 0,"FECH_SIEM"] <- NA # sustituir fecha de siembra 0 por NA

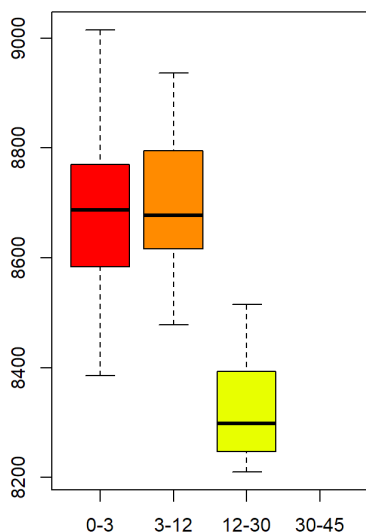
# Prueba opcional: para seleccionar solo datos con agaves sin vegetación
# mydata2013 <- subset(mydata2013, PORC_VEG == 0)
# mydata2014 <- subset(mydata2014, PORC_VEG == 0)
# mydata2015 <- subset(mydata2015, PORC_VEG == 0)
```

Graficas de relación entre rango de pendiente y reflectividad en bandas

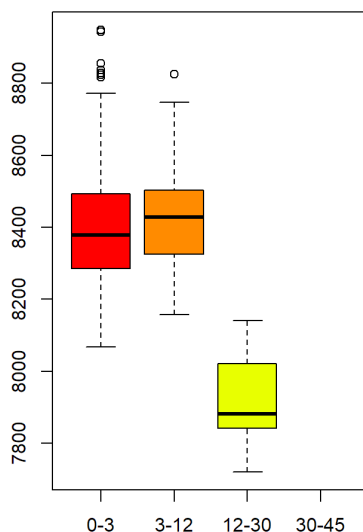
Muestreo de tres imagenes

```
par(mfcol = c(1, 3), cex =1)
boxplot(mydata2015[, "banda2"] ~ factor(mydata2015[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 2 2015", col=rainbow(11))
boxplot(mydata2014[, "banda_2"] ~ factor(mydata2014[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 2 2014", col=rainbow(11))
boxplot(mydata2013[, "BANDA_2"] ~factor(mydata2013[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 2 2013", col=rainbow(11))
```

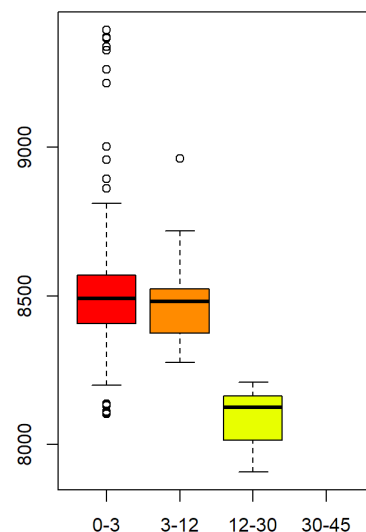
Rango vs. BANDA 2 2015



Rango vs. BANDA 2 2014



Rango vs. BANDA 2 2013

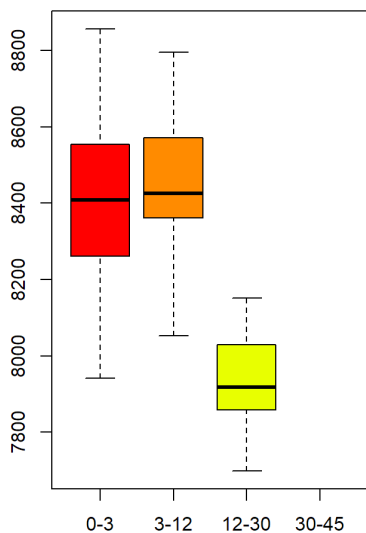


```

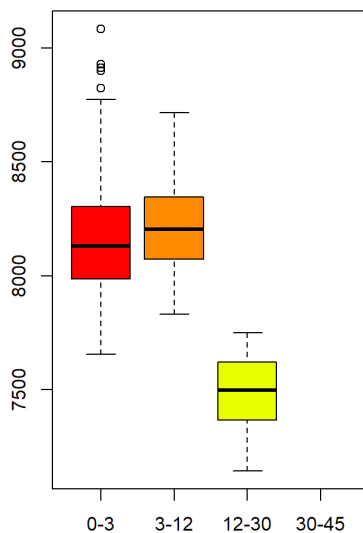
boxplot(mydata2015[, "banda3"] ~ factor(mydata2015[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 3 2015", col=rainbow(11))
boxplot(mydata2014[, "banda_3"] ~ factor(mydata2014[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 3 2014", col=rainbow(11))
boxplot(mydata2013[, "BANDA_3"] ~ factor(mydata2013[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 3 2013", col=rainbow(11))

```

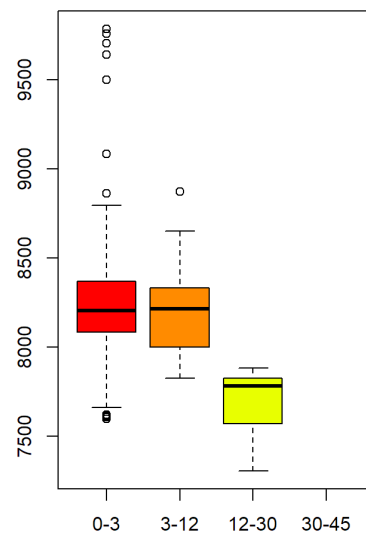
Rango vs. BANDA 3 2015



Rango vs. BANDA 3 2014



Rango vs. BANDA 3 2013

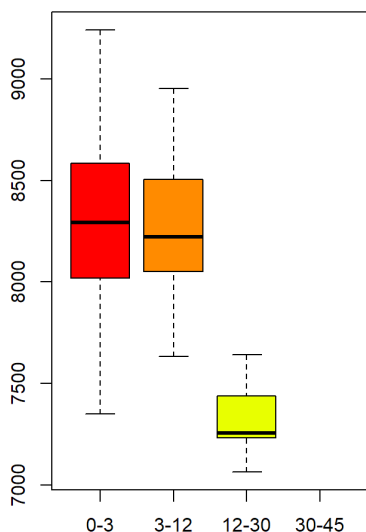


```

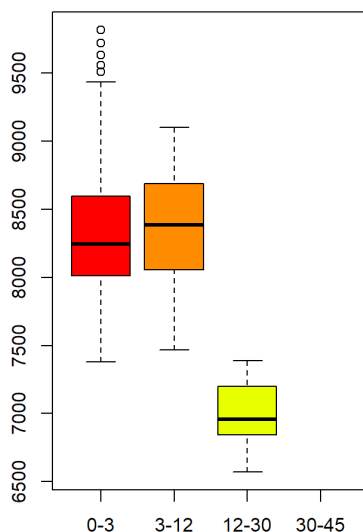
boxplot(mydata2015[, "banda4"] ~ factor(mydata2015[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 4 2015", col=rainbow(11))
boxplot(mydata2014[, "banda_4"] ~ factor(mydata2014[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 4 2014", col=rainbow(11))
boxplot(mydata2013[, "BANDA_4"] ~ factor(mydata2013[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 4 2013", col=rainbow(11))

```

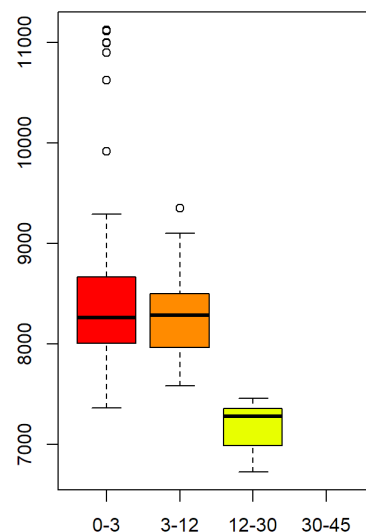
Rango vs. BANDA 4 2015



Rango vs. BANDA 4 2014

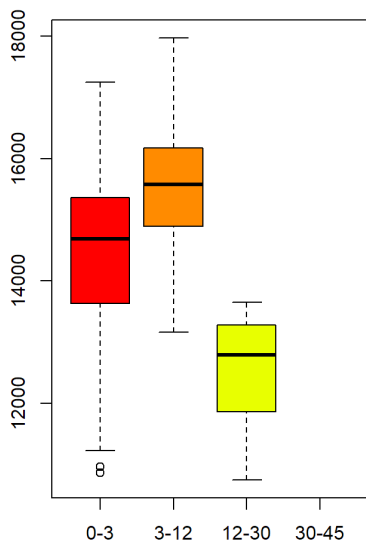


Rango vs. BANDA 4 2013

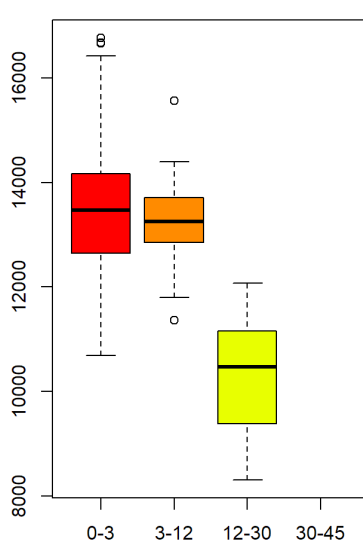


```
boxplot(mydata2015[, "banda5"] ~ factor(mydata2015[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 5 2015", col=rainbow(11))
boxplot(mydata2014[, "banda_5"] ~ factor(mydata2014[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 5 2014", col=rainbow(11))
boxplot(mydata2013[, "BANDA_5"] ~ factor(mydata2013[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 5 2013", col=rainbow(11))
```

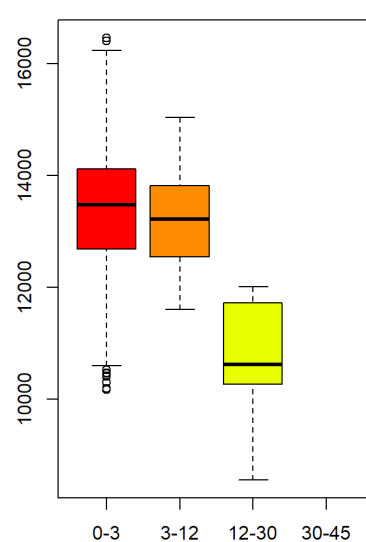
Rango vs. BANDA 5 2015



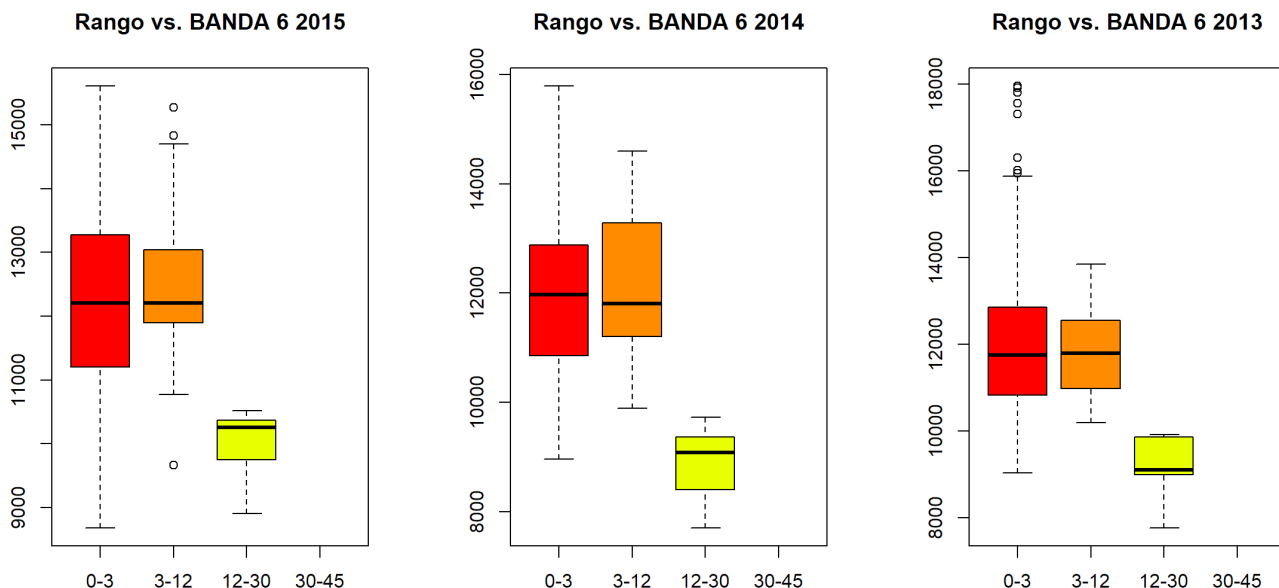
Rango vs. BANDA 5 2014



Rango vs. BANDA 5 2013



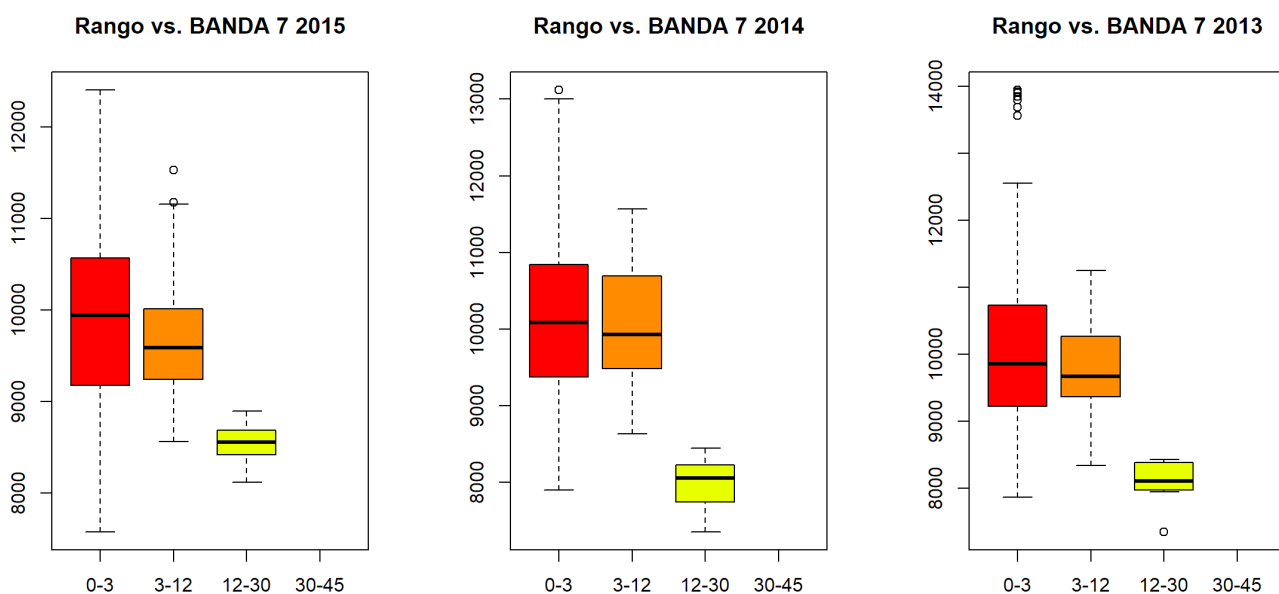
```
boxplot(mydata2015[, "banda6"] ~ factor(mydata2015[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 6 2015", col=rainbow(11))
boxplot(mydata2014[, "banda_6"] ~ factor(mydata2014[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 6 2014", col=rainbow(11))
boxplot(mydata2013[, "BANDA_6"] ~ factor(mydata2013[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 6 2013", col=rainbow(11))
```



```

boxplot(mydata2015[, "banda7"] ~ factor(mydata2015[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 7 2015", col=rainbow(11))
boxplot(mydata2014[, "banda_7"] ~ factor(mydata2014[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 7 2014", col=rainbow(11))
boxplot(mydata2013[, "BANDA_7"] ~ factor(mydata2013[, "Rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 7 2013", col=rainbow(11))

```



Graficas de relación entre porcentaje de malezas y reflectividad en bandas

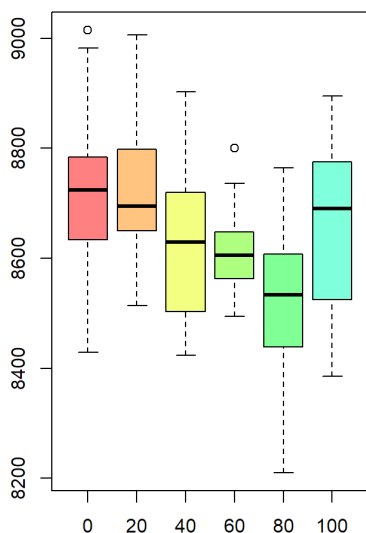
Muestreo de tres imagenes

```

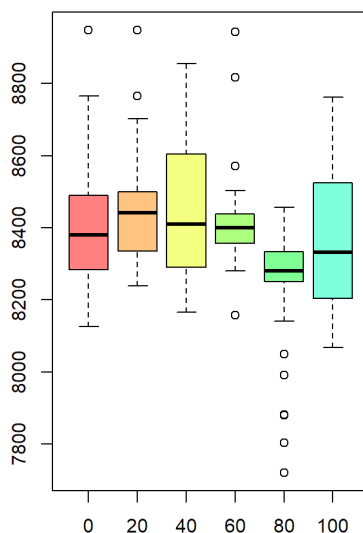
par(mfcol = c(1, 3), cex =1)
boxplot(mydata2015[, "banda2"] ~ factor(mydata2015[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 2 2015", col=rainbow(11, s = 0.5))
boxplot(mydata2014[, "banda_2"] ~ factor(mydata2014[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 2 2014", col=rainbow(11, s = 0.5))
boxplot(mydata2013[, "BANDA_2"] ~ factor(mydata2013[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 2 2013", col=rainbow(11, s = 0.5))

```

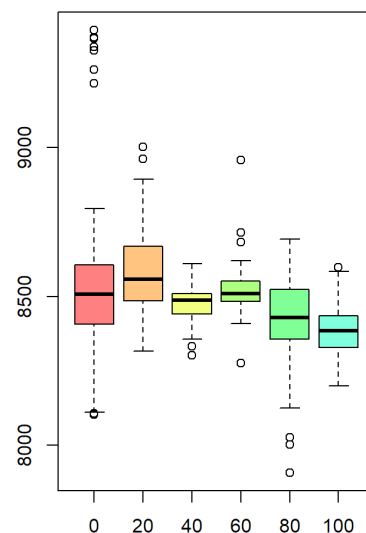
Malezas vs. BANDA 2 2015



Malezas vs. BANDA 2 2014



Malezas vs. BANDA 2 2013

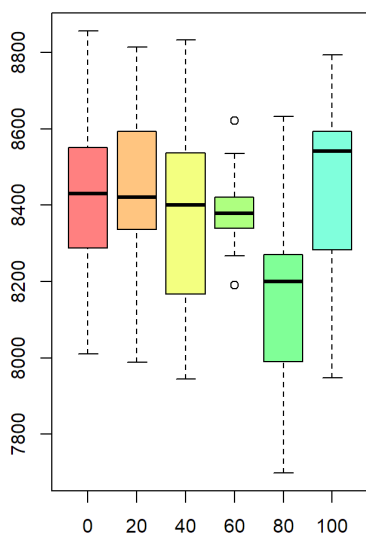


```

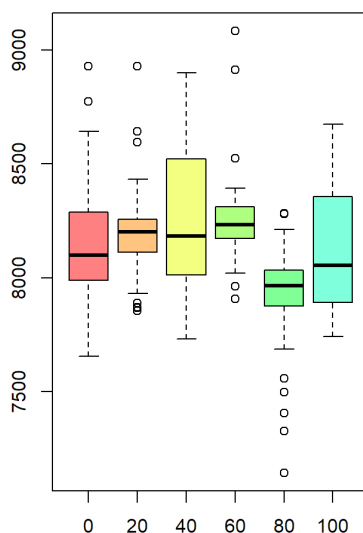
boxplot(mydata2015[, "banda3"] ~ factor(mydata2015[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 3 2015", col=rainbow(11, s = 0.5))
boxplot(mydata2014[, "banda_3"] ~ factor(mydata2014[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 3 2014", col=rainbow(11, s = 0.5))
boxplot(mydata2013[, "BANDA_3"] ~ factor(mydata2013[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 3 2013", col=rainbow(11, s = 0.5))

```

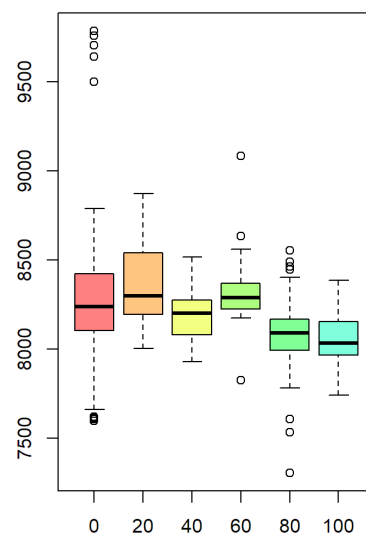
Malezas vs. BANDA 3 2015



Malezas vs. BANDA 3 2014



Malezas vs. BANDA 3 2013

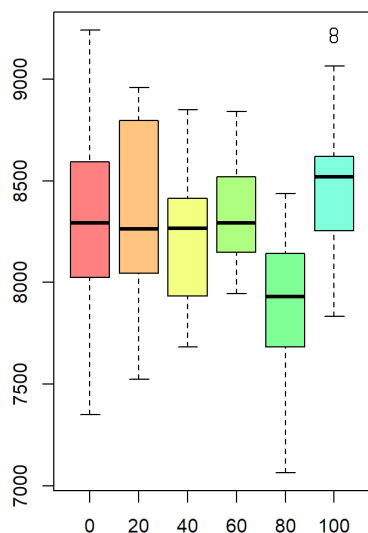


```

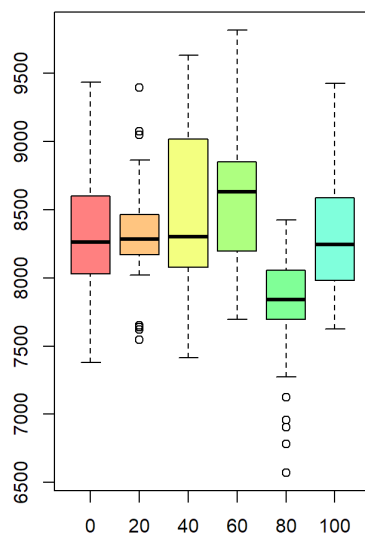
boxplot(mydata2015[, "banda4"] ~ factor(mydata2015[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 4 2015", col=rainbow(11, s = 0.5))
boxplot(mydata2014[, "banda_4"] ~ factor(mydata2014[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 4 2014", col=rainbow(11, s = 0.5))
boxplot(mydata2013[, "BANDA_4"] ~ factor(mydata2013[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 4 2013", col=rainbow(11, s = 0.5))

```

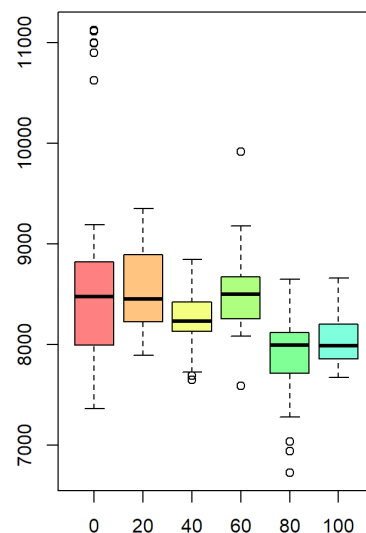
Malezas vs. BANDA 4 2015



Malezas vs. BANDA 4 2014



Malezas vs. BANDA 4 2013

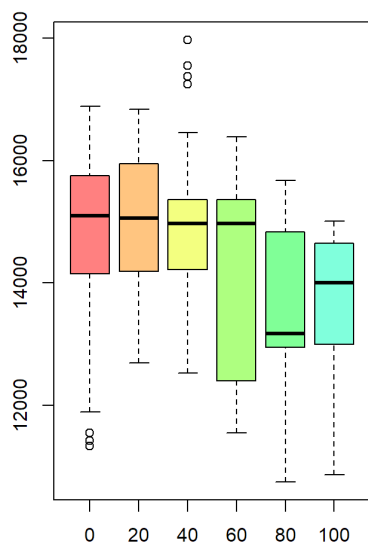


```

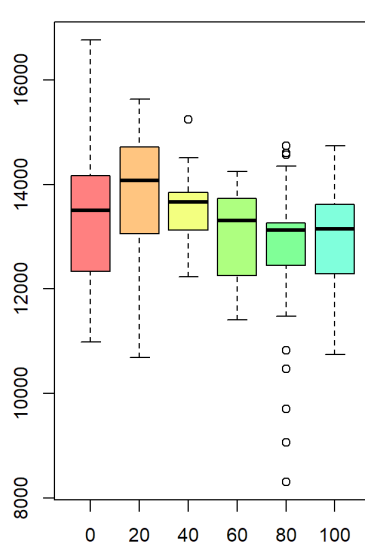
boxplot(mydata2015[, "banda5"] ~ factor(mydata2015[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 5 2015", col=rainbow(11, s = 0.5))
boxplot(mydata2014[, "banda_5"] ~ factor(mydata2014[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 5 2014", col=rainbow(11, s = 0.5))
boxplot(mydata2013[, "BANDA_5"] ~ factor(mydata2013[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 5 2013", col=rainbow(11, s = 0.5))

```

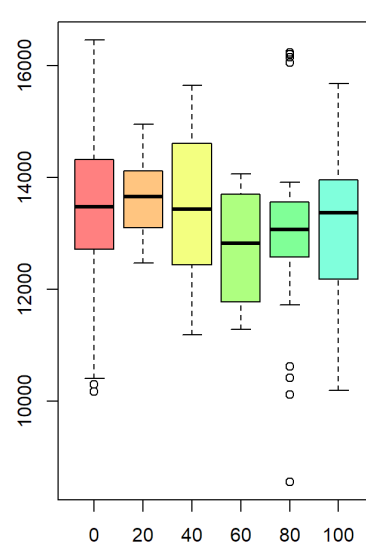
Malezas vs. BANDA 5 2015



Malezas vs. BANDA 5 2014



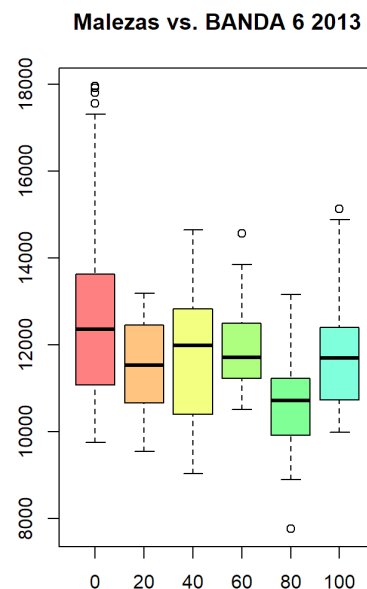
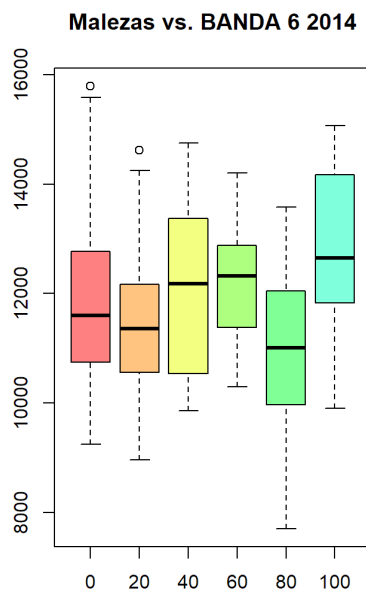
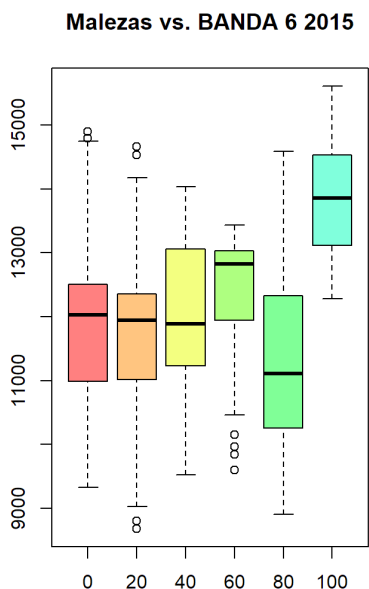
Malezas vs. BANDA 5 2013



```

boxplot(mydata2015[, "banda6"] ~ factor(mydata2015[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 6 2015", col=rainbow(11, s = 0.5))
boxplot(mydata2014[, "banda_6"] ~ factor(mydata2014[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 6 2014", col=rainbow(11, s = 0.5))
boxplot(mydata2013[, "BANDA_6"] ~ factor(mydata2013[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 6 2013", col=rainbow(11, s = 0.5))

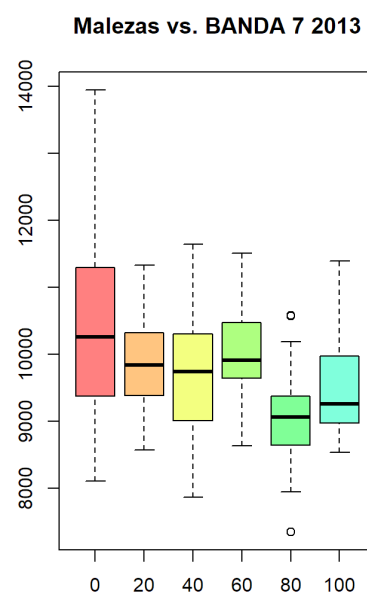
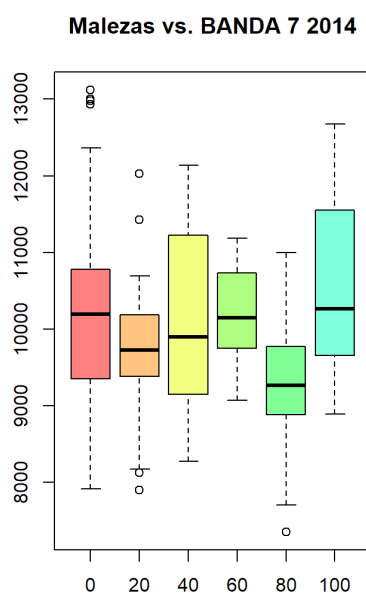
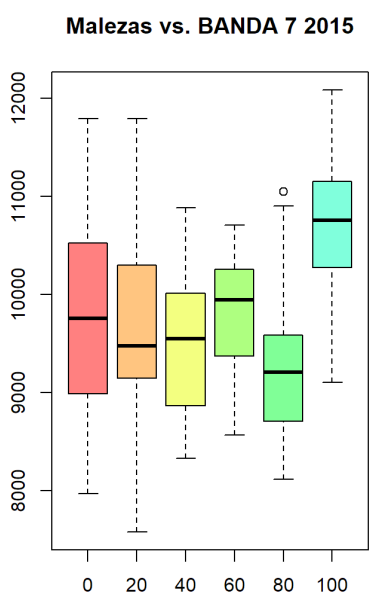
```



```

boxplot(mydata2015[, "banda7"] ~ factor(mydata2015[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 7 2015", col=rainbow(11, s = 0.5))
boxplot(mydata2014[, "banda_7"] ~ factor(mydata2014[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 7 2014", col=rainbow(11, s = 0.5))
boxplot(mydata2013[, "BANDA_7"] ~ factor(mydata2013[, "PORC_VEG"], levels=
c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 7 2013", col=rainbow(11, s = 0.5))

```

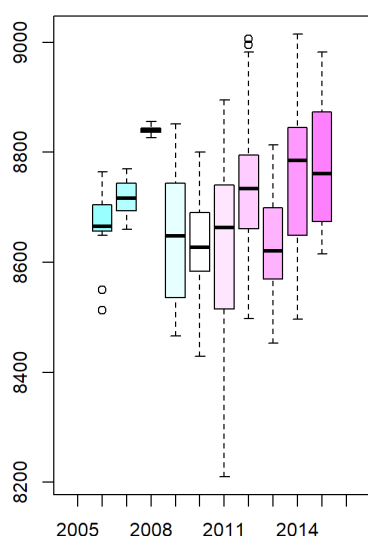


Graficas de relación entre fecha de siembra de agave y reflectividad en bandas

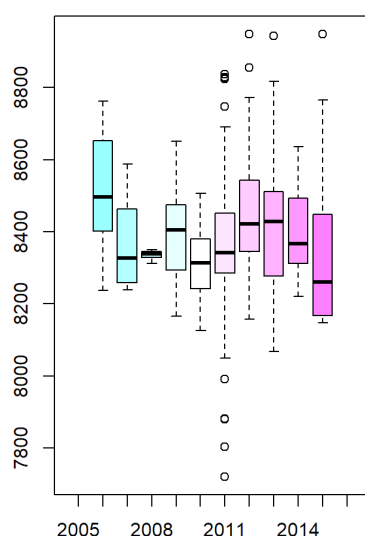
Muestreo de tres imagenes

```
par(mfcol = c(1, 3), cex =1)
boxplot(mydata2015[, "banda2"] ~ factor(mydata2015[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 2 2015",col=cm.colors(11))
boxplot(mydata2014[, "banda_2"] ~ factor(mydata2014[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 2 2014",col=cm.colors(11))
boxplot(mydata2013[, "BANDA_2"] ~ factor(mydata2013[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 2 2013",col=cm.colors(11))
```

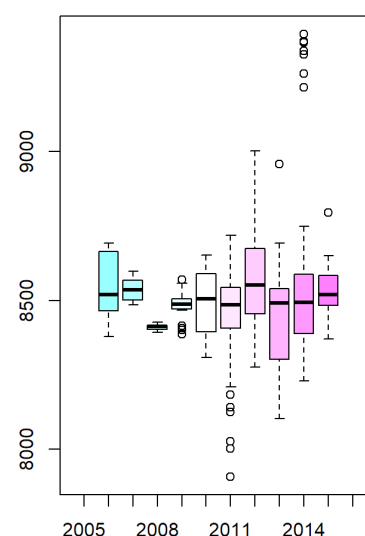
Fechas de siembra vs. BANDA 2 2015



Fechas de siembra vs. BANDA 2 2014

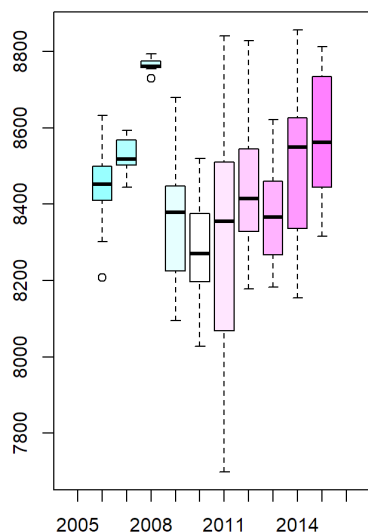


Fechas de siembra vs. BANDA 2 2013

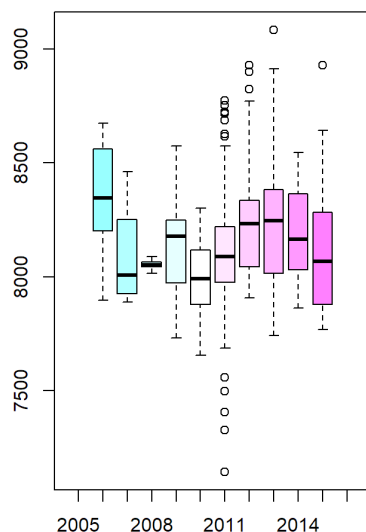


```
boxplot(mydata2015[, "banda3"] ~ factor(mydata2015[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 3 2015",col=cm.colors(11))
boxplot(mydata2014[, "banda_3"] ~ factor(mydata2014[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 3 2014",col=cm.colors(11))
boxplot(mydata2013[, "BANDA_3"] ~ factor(mydata2013[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 3 2013",col=cm.colors(11))
```

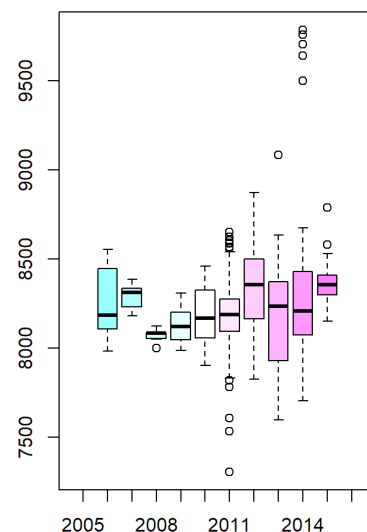

Fechas de siembra vs. BANDA 3 2015



Fechas de siembra vs. BANDA 3 2014



Fechas de siembra vs. BANDA 3 2013

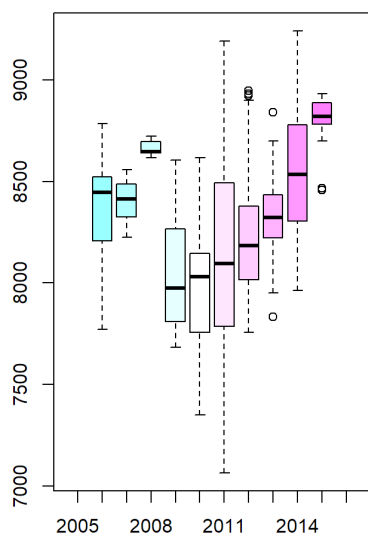


```

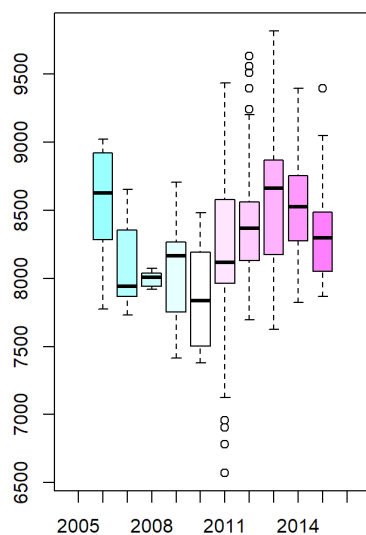
boxplot(mydata2015[, "banda4"] ~ factor(mydata2015[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 4 2015",col=cm.colors(11))
boxplot(mydata2014[, "banda_4"] ~ factor(mydata2014[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 4 2014",col=cm.colors(11))
boxplot(mydata2013[, "BANDA_4"] ~ factor(mydata2013[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 4 2013",col=cm.colors(11))

```

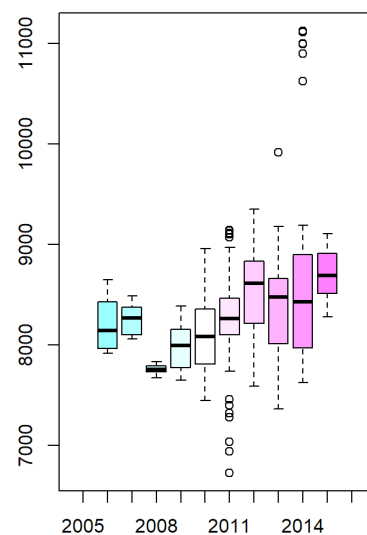
Fechas de siembra vs. BANDA 4 2015



Fechas de siembra vs. BANDA 4 2014



Fechas de siembra vs. BANDA 4 2013

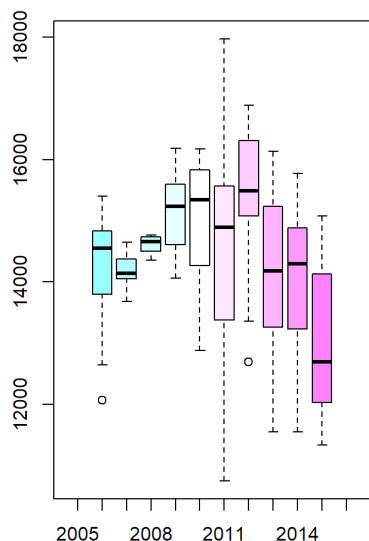


```

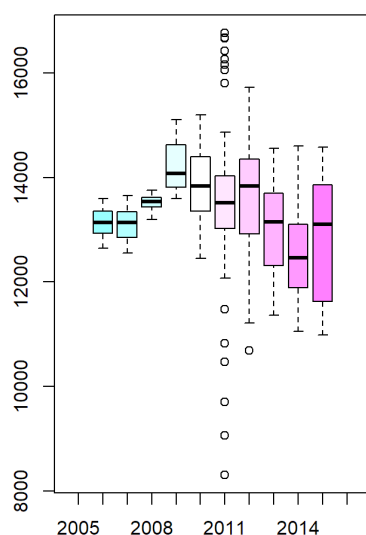
boxplot(mydata2015[, "banda5"] ~ factor(mydata2015[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 5 2015",col=cm.colors(11))
boxplot(mydata2014[, "banda_5"] ~ factor(mydata2014[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 5 2014",col=cm.colors(11))
boxplot(mydata2013[, "BANDA_5"] ~ factor(mydata2013[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 5 2013",col=cm.colors(11))

```

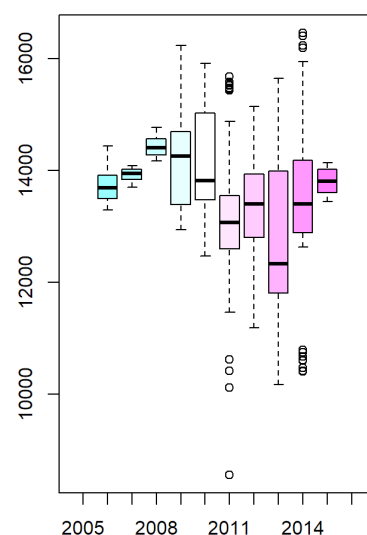
Fechas de siembra vs. BANDA 5 2015



Fechas de siembra vs. BANDA 5 2014

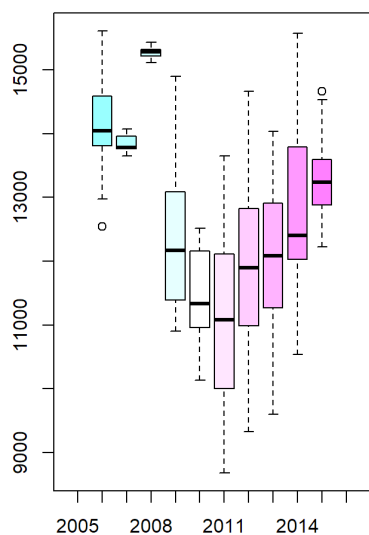


Fechas de siembra vs. BANDA 5 2013

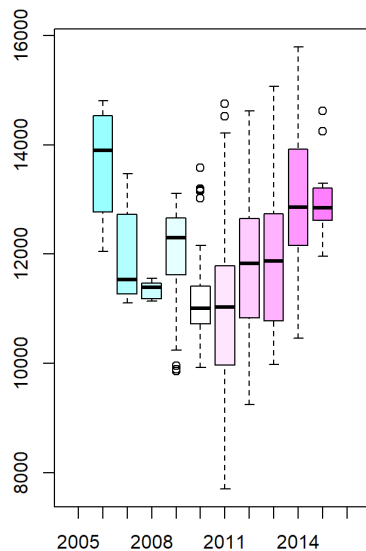


```
boxplot(mydata2015[, "banda6"] ~ factor(mydata2015[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 6 2015",col=cm.colors(11))
boxplot(mydata2014[, "banda_6"] ~ factor(mydata2014[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 6 2014",col=cm.colors(11))
boxplot(mydata2013[, "BANDA_6"] ~ factor(mydata2013[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 6 2013",col=cm.colors(11))
```

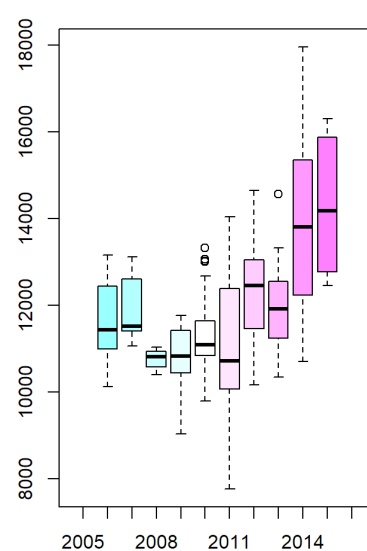
Fechas de siembra vs. BANDA 6 2015



Fechas de siembra vs. BANDA 6 2014

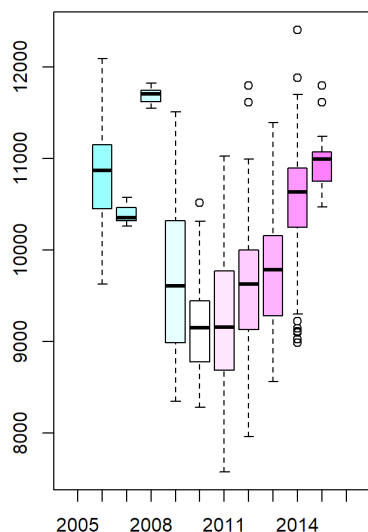


Fechas de siembra vs. BANDA 6 2013

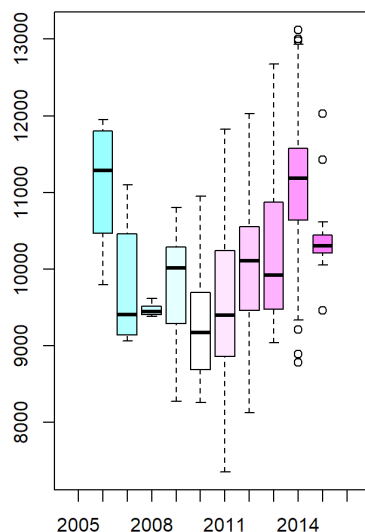


```
boxplot(mydata2015[, "banda7"] ~ factor(mydata2015[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 7 2015",col=cm.colors(11))
boxplot(mydata2014[, "banda_7"] ~ factor(mydata2014[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 7 2014",col=cm.colors(11))
boxplot(mydata2013[, "BANDA_7"] ~ factor(mydata2013[, "FECH_SIEM"], levels= c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 7 2013",col=cm.colors(11))
```

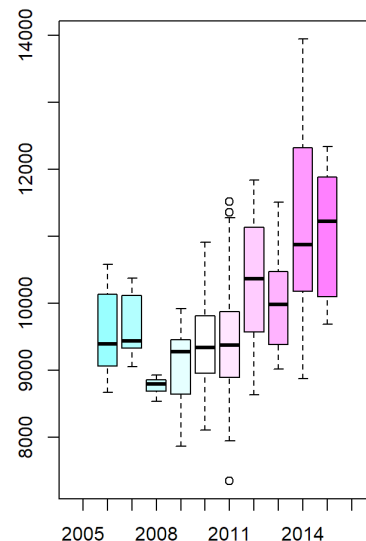
Fechas de siembra vs. BANDA 7 2015



Fechas de siembra vs. BANDA 7 2014



Fechas de siembra vs. BANDA 7 2013



Normalización de mediana de reflectividad en bandas para hacer compatibles datos de muestreo de las tres imagenes

normalización de mediana consiste en que cada una de las muestras se ajusta sobre la mediana

```
mydata2013_b2n <- mydata2013[, "BANDA_2"] - median(mydata2013[, "BANDA_2"])
mydata2014_b2n <- mydata2014[, "banda_2"] - median(mydata2014[, "banda_2"])
mydata2015_b2n <- mydata2015[, "banda2"] - median(mydata2015[, "banda2"])

mydata2013_b3n <- mydata2013[, "BANDA_3"] - median(mydata2013[, "BANDA_3"])
mydata2014_b3n <- mydata2014[, "banda_3"] - median(mydata2014[, "banda_3"])
mydata2015_b3n <- mydata2015[, "banda3"] - median(mydata2015[, "banda3"])

mydata2013_b4n <- mydata2013[, "BANDA_4"] - median(mydata2013[, "BANDA_4"])
mydata2014_b4n <- mydata2014[, "banda_4"] - median(mydata2014[, "banda_4"])
mydata2015_b4n <- mydata2015[, "banda4"] - median(mydata2015[, "banda4"])

mydata2013_b5n <- mydata2013[, "BANDA_5"] - median(mydata2013[, "BANDA_5"])
mydata2014_b5n <- mydata2014[, "banda_5"] - median(mydata2014[, "banda_5"])
mydata2015_b5n <- mydata2015[, "banda5"] - median(mydata2015[, "banda5"])

mydata2013_b6n <- mydata2013[, "BANDA_6"] - median(mydata2013[, "BANDA_6"])
mydata2014_b6n <- mydata2014[, "banda_6"] - median(mydata2014[, "banda_6"])
mydata2015_b6n <- mydata2015[, "banda6"] - median(mydata2015[, "banda6"])

mydata2013_b7n <- mydata2013[, "BANDA_7"] - median(mydata2013[, "BANDA_7"])
mydata2014_b7n <- mydata2014[, "banda_7"] - median(mydata2014[, "banda_7"])
mydata2015_b7n <- mydata2015[, "banda7"] - median(mydata2015[, "banda7"])
```

Integración de las tablas que corresponden a imagenes en tres fechas en una sola tabla para el analisis posterior

```

# porcentaje de vegetación es columna numerica y no requiere conversión
mydataFULL_PORC_VEG <- c(mydata2013[, "PORC_VEG"], mydata2014[, "PORC_VEG"], mydata2015[, "PORC_VEG"])

# rango es un factor y requiere transformación a cadenas de simbolos
mydataFULL_RANGO <- c(as.character(mydata2013[, "Rango"]),
                      as.character(mydata2014[, "Rango"]),
                      as.character(mydata2015[, "Rango"]))

# fecha de siembra es un factor y requiere transformación a cadenas de simbolos
mydataFULL_FECH_SIEM <- c(as.character(mydata2013[, "FECH_SIEM"]),
                          as.character(mydata2014[, "FECH_SIEM"]),
                          as.character(mydata2015[, "FECH_SIEM"]))

# bandas normalizadas con mediana son numéricas y non requieren conversión de formato
mydataFULL_b2n <- c(mydata2013_b2n, mydata2014_b2n, mydata2015_b2n)
mydataFULL_b3n <- c(mydata2013_b3n, mydata2014_b3n, mydata2015_b3n)
mydataFULL_b4n <- c(mydata2013_b4n, mydata2014_b4n, mydata2015_b4n)
mydataFULL_b5n <- c(mydata2013_b5n, mydata2014_b5n, mydata2015_b5n)
mydataFULL_b6n <- c(mydata2013_b6n, mydata2014_b6n, mydata2015_b6n)
mydataFULL_b7n <- c(mydata2013_b7n, mydata2014_b7n, mydata2015_b7n)

mydataFULL <- data.frame(
  porc_veg=mydataFULL_PORC_VEG,
  rango=mydataFULL_RANGO,
  fech_siem=mydataFULL_FECH_SIEM,
  porc_veg_f=as.factor(mydataFULL_PORC_VEG),
  b2n=mydataFULL_b2n,
  b3n=mydataFULL_b3n,
  b4n=mydataFULL_b4n,
  b5n=mydataFULL_b5n,
  b6n=mydataFULL_b6n,
  b7n=mydataFULL_b7n)

# convertir columnas de rango y fecha de siembra a factores
mydataFULL[, "rango_f"] <- as.factor(mydataFULL[, "rango"])
mydataFULL[, "rango_f"] <- factor(mydataFULL[, "rango"], levels = c("0-3", "3-12", "12-30", "30-45"))
mydataFULL[, "fech_siem_f"] <- as.factor(mydataFULL[, "fech_siem"])
mydataFULL[, "fech_siem_f"] <- factor(mydataFULL[, "fech_siem"],
  levels =
  c("2005", "2006", "2007", "2008", "2009", "2010", "2011", "2012", "2013", "2014", "2015", "2016"))

```

Graficas de relación entre rango de pendiente y reflectividad en bandas

Tabla integrada

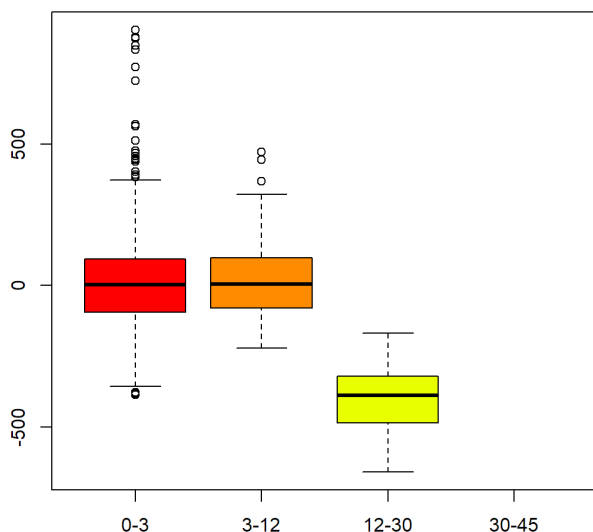
```

par(mfcol = c(1, 2), cex = 1)

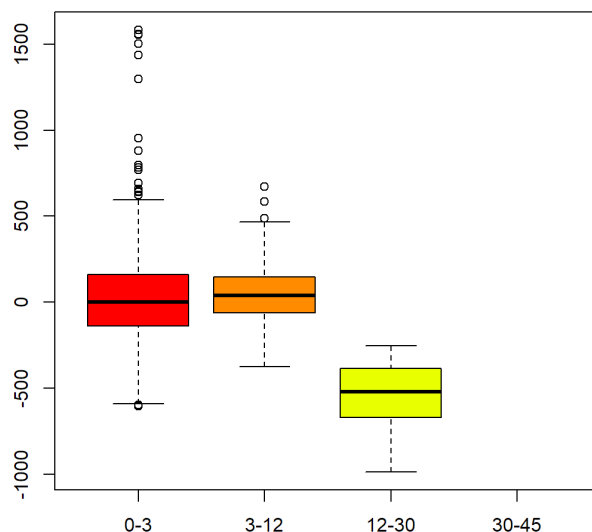
boxplot(mydataFULL[, "b2n"] ~ factor(mydataFULL[, "rango"], levels = c("0-3", "3-12", "12-30", "30-45")), main = "Rango vs. BANDA 2 FULL", col = rainbow(11))
boxplot(mydataFULL[, "b3n"] ~ factor(mydataFULL[, "rango"], levels = c("0-3", "3-12", "12-30", "30-45")), main = "Rango vs. BANDA 3 FULL", col = rainbow(11))

```

Rango vs. BANDA 2 FULL

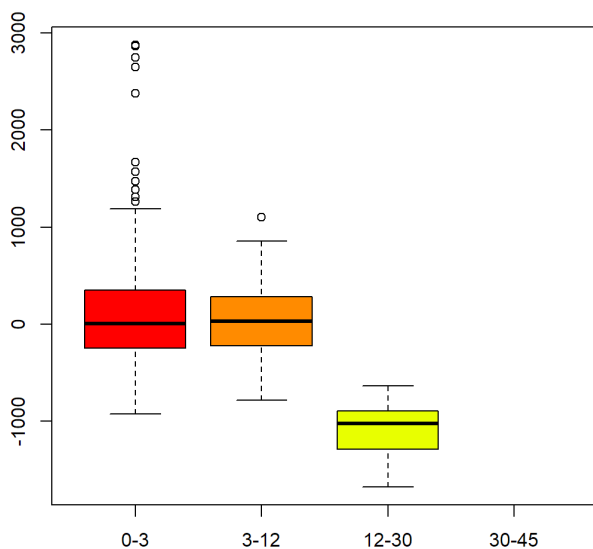


Rango vs. BANDA 3 FULL

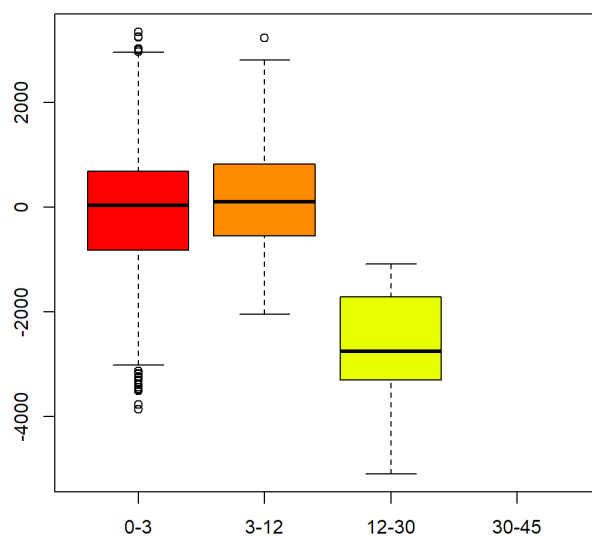


```
boxplot(mydataFULL[, "b4n"] ~ factor(mydataFULL[, "rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 4 FULL", col=rainbow(11))
boxplot(mydataFULL[, "b5n"] ~ factor(mydataFULL[, "rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 5 FULL", col=rainbow(11))
```

Rango vs. BANDA 4 FULL

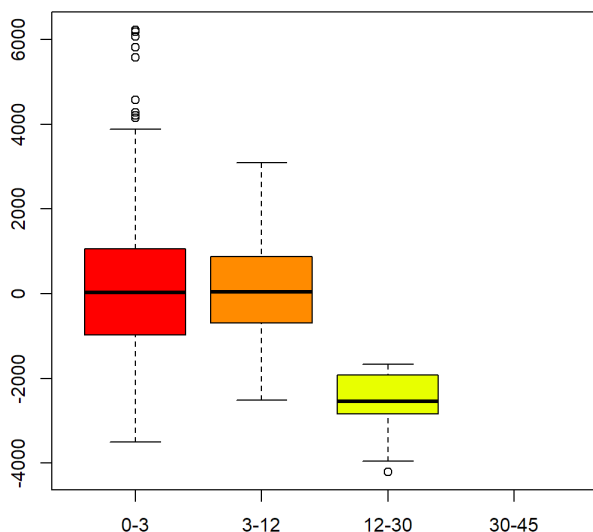


Rango vs. BANDA 5 FULL

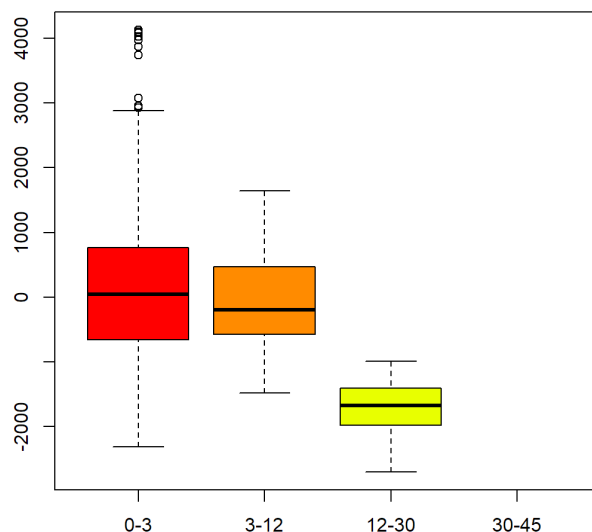


```
boxplot(mydataFULL[, "b6n"] ~ factor(mydataFULL[, "rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 6 FULL", col=rainbow(11))
boxplot(mydataFULL[, "b7n"] ~ factor(mydataFULL[, "rango"], levels= c("0-3", "3-12", "12-30", "30-45")), main="Rango vs. BANDA 7 FULL", col=rainbow(11))
```

Rango vs. BANDA 6 FULL



Rango vs. BANDA 7 FULL

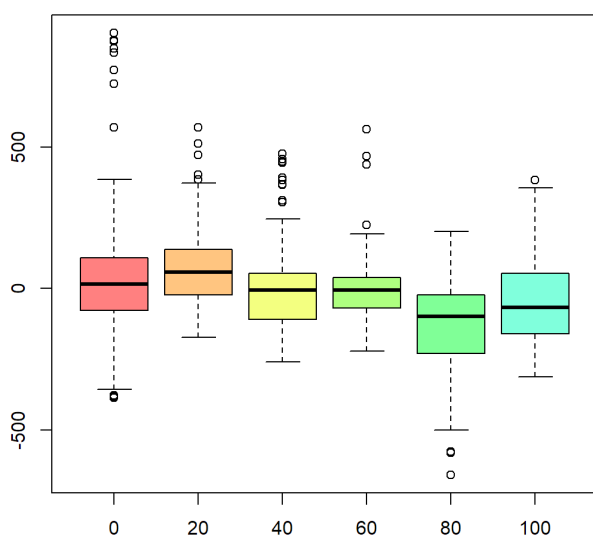


Graficas de relación entre porcentaje de malezas y reflectividad en bandas

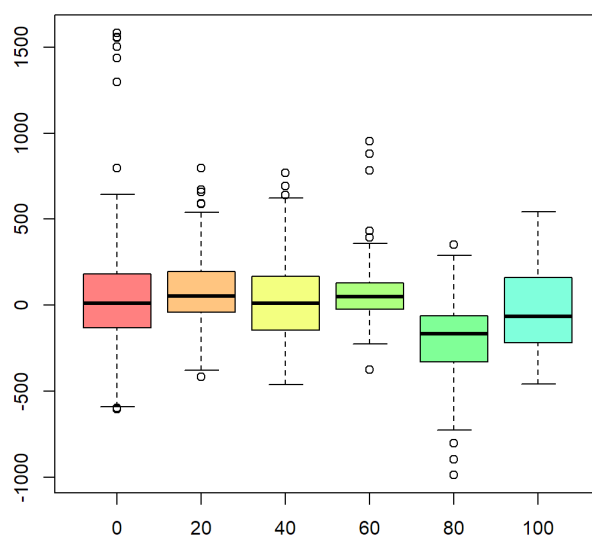
Tabla integrada

```
par(mfcol = c(1, 2), cex = 1)
boxplot(mydataFULL[, "b2n"] ~ factor(mydataFULL[, "porc_veg"], levels= c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 2 FULL", col=rainbow(11, s = 0.5))
boxplot(mydataFULL[, "b3n"] ~ factor(mydataFULL[, "porc_veg"], levels= c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 3 FULL", col=rainbow(11, s = 0.5))
```

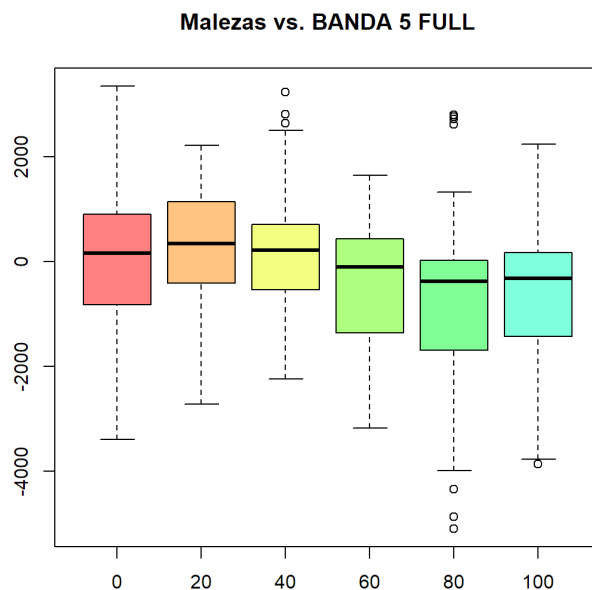
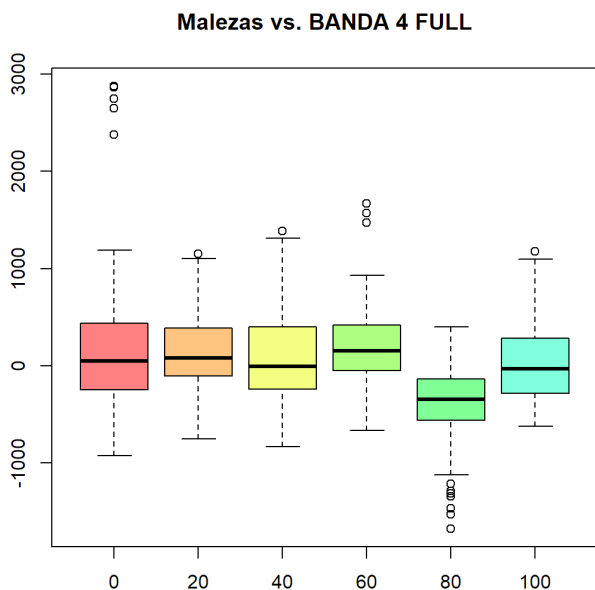
Malezas vs. BANDA 2 FULL



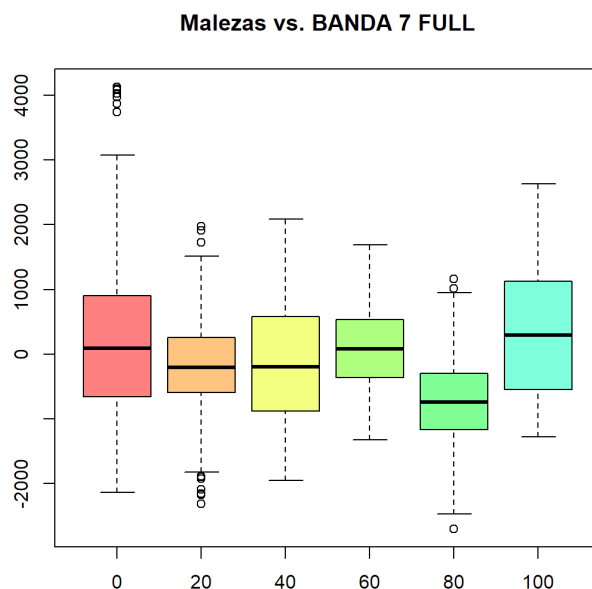
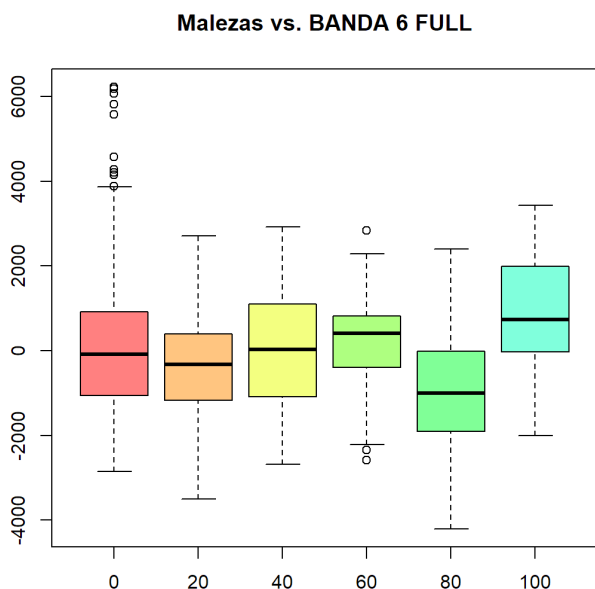
Malezas vs. BANDA 3 FULL



```
boxplot(mydataFULL[, "b4n"] ~ factor(mydataFULL[, "porc_veg"], levels= c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 4 FULL", col=rainbow(11, s = 0.5))
boxplot(mydataFULL[, "b5n"] ~ factor(mydataFULL[, "porc_veg"], levels= c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 5 FULL", col=rainbow(11, s = 0.5))
```



```
boxplot(mydataFULL[, "b6n"] ~ factor(mydataFULL[, "porc_veg"], levels= c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 6 FULL", col=rainbow(11, s = 0.5))
boxplot(mydataFULL[, "b7n"] ~ factor(mydataFULL[, "porc_veg"], levels= c("0", "20", "40", "60", "80", "100")), main="Malezas vs. BANDA 7 FULL", col=rainbow(11, s = 0.5))
```

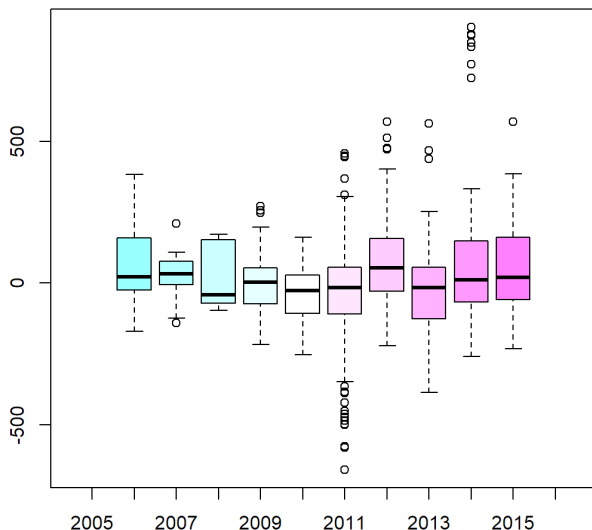


Graficas de relación entre fecha de siembra de agave y reflectividad en bandas

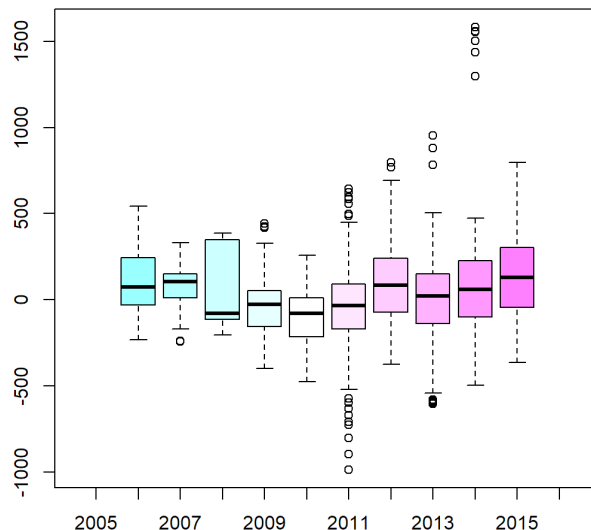
Tabla integrada

```
par(mfcol = c(1, 2), cex =1)
boxplot(mydataFULL[, "b2n"] ~ factor(mydataFULL[, "fech_siem"], levels=
c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 2 FULL",col=cm.colors(11))
boxplot(mydataFULL[, "b3n"] ~ factor(mydataFULL[, "fech_siem"], levels=
c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 3 FULL",col=cm.colors(11))
```

Fechas de siembra vs. BANDA 2 FULL

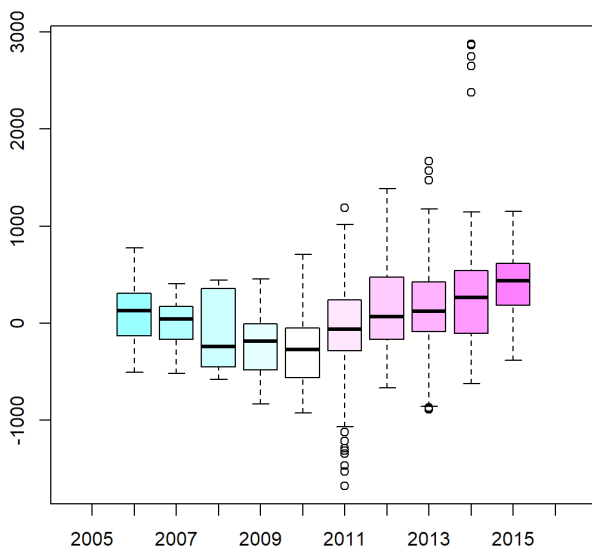


Fechas de siembra vs. BANDA 3 FULL

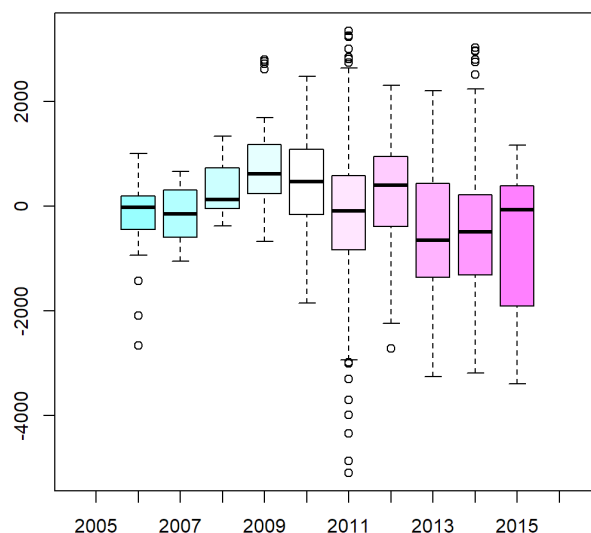


```
boxplot(mydataFULL[, "b4n"] ~ factor(mydataFULL[, "fech_siem"], levels=
c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 4 FULL",col=cm.colors(11))
boxplot(mydataFULL[, "b5n"] ~ factor(mydataFULL[, "fech_siem"], levels=
c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 5 FULL",col=cm.colors(11))
```

Fechas de siembra vs. BANDA 4 FULL

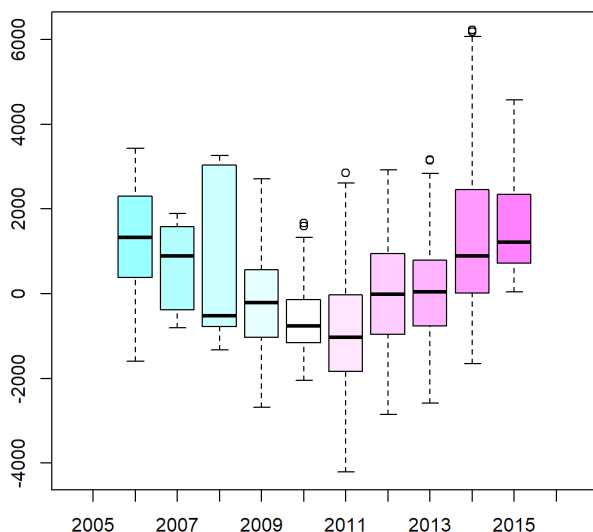


Fechas de siembra vs. BANDA 5 FULL

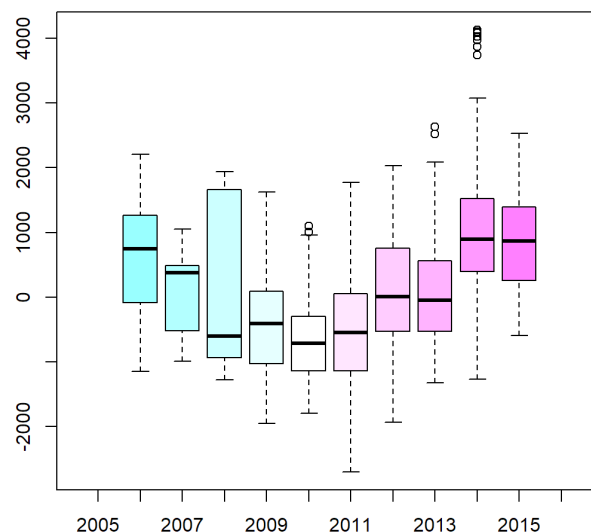


```
boxplot(mydataFULL[, "b6n"] ~ factor(mydataFULL[, "fech_siem"], levels=
c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 6 FULL",col=cm.colors(11))
boxplot(mydataFULL[, "b7n"] ~ factor(mydataFULL[, "fech_siem"], levels=
c(seq(from=2005,to=2016,by=1))),main="Fechas de siembra vs. BANDA 7 FULL",col=cm.colors(11))
```


Fechas de siembra vs. BANDA 6 FULL



Fechas de siembra vs. BANDA 7 FULL



Resumen complementario de las tablas fuente y la tabla integrada

```
# tamaño de tablas
dim(mydata2013)
```

```
## [1] 424 60
```

```
dim(mydata2014)
```

```
## [1] 424 59
```

```
dim(mydata2015)
```

```
## [1] 424 59
```

```
dim(mydataFULL)
```

```
## [1] 1272 12
```

```
# resumen de tablas
summary(mydata2013)
```

```

##      FID_1      FID_1_1      FID_Clip_P      POINTID
## Min.   : 0.0    Min.   : 0.0    Min.   : 0.00    Min.   :145830
## 1st Qu.:105.8    1st Qu.:105.8    1st Qu.: 97.75    1st Qu.:255406
## Median :211.5    Median :211.5    Median :198.50    Median :327261
## Mean   :211.5    Mean   :211.5    Mean   :200.58    Mean   :327966
## 3rd Qu.:317.2    3rd Qu.:317.2    3rd Qu.:304.25    3rd Qu.:393139
## Max.   :423.0    Max.   :423.0    Max.   :410.00    Max.   :557959
##
##      GRID_CODE      FID_Buffer      OBJECTID      IDENTIDAD
## Min.   : 6608    Min.   : 0.00    Min.   : 1.00    70      : 9
## 1st Qu.: 8639    1st Qu.:14.00    1st Qu.: 44.00    63      : 8
## Median : 9318    Median :29.00    Median : 63.00    71      : 8
## Mean   :11460    Mean   :29.18    Mean   : 68.28    73      : 8
## 3rd Qu.:10980    3rd Qu.:44.00    3rd Qu.:106.00    83      : 8
## Max.   :29151    Max.   :59.00    Max.   :121.00    (Other):152
##                                     NA's    :231
##      FID_1_1_1      FID_12      FID_1_1__1      OBJECTID_1
## Min.   : 0.0    Min.   : 0.00    Min.   : 0.00    Min.   : 1.00
## 1st Qu.:14.0    1st Qu.:14.00    1st Qu.:14.00    1st Qu.: 44.00
## Median :29.0    Median :29.00    Median :29.00    Median : 63.00
## Mean   :29.3    Mean   :29.28    Mean   :29.18    Mean   : 68.28
## 3rd Qu.:44.0    3rd Qu.:44.00    3rd Qu.:44.00    3rd Qu.:106.00
## Max.   :59.0    Max.   :59.00    Max.   :59.00    Max.   :121.00
##
##      IDENTIDA_1      TIEMPO      FECH_SIEM      NOM
## 70      : 9    2016-02-12T17:46:53Z: 9    Min.   :2006    ATRAVESAÑO: 24
## 63      : 8    2015-09-30T15:18:46Z: 8    1st Qu.:2010    EL LINERO : 15
## 71      : 8    2015-09-30T16:12:34Z: 8    Median :2012    EL ZAPOTE : 15
## 73      : 8    2015-09-30T16:31:02Z: 8    Mean   :2012    EL MONTE  : 14
## 83      : 8    2015-09-30T17:36:10Z: 8    3rd Qu.:2013    LA TIJERA : 14
## (Other):152    (Other)          :245    Max.   :2015    (Other)   :104
## NA's    :231    NA's            :138    NA's    :35     NA's      :238
##      GRAD_MAD      EDAD      CULT_INTER      ALTURA
## INICIO:123    Min.   :0.000    NO          :161    Min.   :1077
## MADURO: 82    1st Qu.:1.000    0% VEGETACION : 36    1st Qu.:1207
## NULO : 63     Median :3.000    SI           : 30    Median :1232
## PLENO :156    Mean   :3.104    100% VEGETACION : 29    Mean   :1233
##                                     3rd Qu.:4.000    0% OTRA VEGETACION: 22    3rd Qu.:1251
##                                     Max.   :9.000    (Other)       :113    Max.   :1350
##                                     NA's      : 33
##      SUPERF      LONG_      LATIT      N_PUNTO
## Min.   : 0.000    Min.   : 633428    Min.   : 628409    Min.   : 0.00
## 1st Qu.: 0.000    1st Qu.: 635570    1st Qu.: 631222    1st Qu.: 3.00
## Median : 0.000    Median : 639917    Median :2302358    Median :18.00
## Mean   : 1.001    Mean   :1397464    Mean   :1542965    Mean   :20.18
## 3rd Qu.: 0.000    3rd Qu.:2308131    3rd Qu.:2305145    3rd Qu.:34.00
## Max.   :20.700    Max.   :2310671    Max.   :2307679    Max.   :52.00
##
##      VEGETA      PORC_VEG      BUFF_DIST      BANDA_2      BANDA_3
## MAIZ : 36    Min.   : 0.00    Min.   :45    Min.   :7908    Min.   :7306
## MALEZA:224    1st Qu.: 0.00    1st Qu.:45    1st Qu.:8394    1st Qu.:8068
## NULO :157    Median : 20.00    Median :45    Median :8490    Median :8203
## NA's : 7     Mean   : 36.04    Mean   :45    Mean   :8493    Mean   :8226
##                                     3rd Qu.: 60.00    3rd Qu.:45    3rd Qu.:8557    3rd Qu.:8365
##                                     Max.   :100.00    Max.   :45    Max.   :9394    Max.   :9787
##
##      BANDA_4      BANDA_5      BANDA_6      BANDA_7      POR_VEG_T

```

```

## Min. : 6725 Min. : 8557 Min. : 7767 Min. : 7351 0 :171
## 1st Qu.: 7991 1st Qu.:12630 1st Qu.:10805 1st Qu.: 9208 100: 71
## Median : 8250 Median :13427 Median :11726 Median : 9817 20 : 56
## Mean : 8332 Mean :13328 Mean :11998 Mean : 9984 40 : 51
## 3rd Qu.: 8653 3rd Qu.:14088 3rd Qu.:12796 3rd Qu.:10660 50 : 14
## Max. :11130 Max. :16460 Max. :17961 Max. :13950 60 : 28
## 80 : 33
##
## FID_2 OBJECTID_2 ID AREA
## Min. :0.000 Min. :8857 Min. :8856 Min. : 91724772
## 1st Qu.:5.000 1st Qu.:8897 1st Qu.:8896 1st Qu.: 91724772
## Median :5.000 Median :8897 Median :8896 Median : 91724772
## Mean :4.712 Mean :8891 Mean :8890 Mean :124650952
## 3rd Qu.:5.000 3rd Qu.:8897 3rd Qu.:8896 3rd Qu.:171494647
## Max. :7.000 Max. :8901 Max. :8900 Max. :214975438
##
## PERIMETER NACIONAL_ NACIONAL_I CLAVE
## Min. : 53307 Min. :8858 Min. :8915 Hh+I+Lc/2/L: 47
## 1st Qu.: 53307 1st Qu.:8898 1st Qu.:8955 Hl+I/2/P : 44
## Median : 53307 Median :8898 Median :8955 I+Hh+Lc/2 : 74
## Mean : 61586 Mean :8892 Mean :8949 I+Re+Hh/2 : 7
## 3rd Qu.: 61754 3rd Qu.:8898 3rd Qu.:8955 Lv+Lc/3 :252
## Max. :140486 Max. :8902 Max. :8959
##
## FC NOM_SUE1 NOM_SUB1 NOM_SUE2 NOM_SUB2
## Min. :20984 Feozem : 91 háplico: 47 Feozem : 74 crómico:252
## 1st Qu.:21801 Litosol: 81 lúvico : 44 Litosol: 91 eútrico: 7
## Median :23473 Luvisol:252 vírtico:252 Luvisol:252 háplico: 74
## Mean :22681 NA's : 81 Regosol: 7 NA's : 91
## 3rd Qu.:23473
## Max. :23473
##
## NOM_SUE3 NOM_SUB3 CLA_TEX FAS_FISCA FAS_QUIMI
## Feozem : 7 crómico:121 Fina :252 Lítica : 47 NA's:424
## Luvisol:121 háplico: 7 Media:172 Pedregosa: 44
## NA's :296 NA's :296 NA's :333
##
##
##
## NEWFIELD1 SHAPE_area SHAPE_len FID_3
## Min. :0 Min. : 91719472 Min. : 53305 Min. : 3183
## 1st Qu.:0 1st Qu.: 91719472 1st Qu.: 53305 1st Qu.: 9123
## Median :0 Median : 91719472 Median : 53305 Median : 9123
## Mean :0 Mean :124643961 Mean : 61584 Mean : 9176
## 3rd Qu.:0 3rd Qu.:171486060 3rd Qu.: 61752 3rd Qu.: 9123
## Max. :0 Max. :214963504 Max. :140482 Max. :11198
##
## ID_1 GRIDCODE Rango RP
## Min. : 54268 Min. :1.000 0-3 :383 0-3 :383
## 1st Qu.: 86537 1st Qu.:1.000 12-30: 7 12-30: 7
## Median : 86537 Median :1.000 3-12 : 34 3-12 : 34
## Mean : 90889 Mean :1.113
## 3rd Qu.: 86537 3rd Qu.:1.000
## Max. :153290 Max. :3.000
##

```

```
summary(mydata2014)
```

```

##      FID_1      FID_1_1      FID_Clip_p      POINTID
## Min.   : 0.0    Min.   : 0.0    Min.   : 0.00    Min.   :145830
## 1st Qu.:105.8    1st Qu.:105.8    1st Qu.: 97.75    1st Qu.:255406
## Median :211.5    Median :211.5    Median :198.50    Median :327261
## Mean   :211.5    Mean   :211.5    Mean   :200.58    Mean   :327966
## 3rd Qu.:317.2    3rd Qu.:317.2    3rd Qu.:304.25    3rd Qu.:393139
## Max.   :423.0    Max.   :423.0    Max.   :410.00    Max.   :557959
##
##      GRID_CODE      FID_Buffer      OBJECTID      IDENTIDAD
## Min.   : 6608    Min.   : 0.00    Min.   : 1.00    70      : 9
## 1st Qu.: 8639    1st Qu.:14.00    1st Qu.: 44.00    63      : 8
## Median : 9318    Median :29.00    Median : 63.00    71      : 8
## Mean   :11460    Mean   :29.18    Mean   : 68.28    73      : 8
## 3rd Qu.:10980    3rd Qu.:44.00    3rd Qu.:106.00    83      : 8
## Max.   :29151    Max.   :59.00    Max.   :121.00    (Other):152
##                                     NA's    :231
##      FID_1_1_1      FID_12      FID_1_1__1      OBJECTID_1
## Min.   : 0.0    Min.   : 0.00    Min.   : 0.00    Min.   : 1.00
## 1st Qu.:14.0    1st Qu.:14.00    1st Qu.:14.00    1st Qu.: 44.00
## Median :29.0    Median :29.00    Median :29.00    Median : 63.00
## Mean   :29.3    Mean   :29.28    Mean   :29.18    Mean   : 68.28
## 3rd Qu.:44.0    3rd Qu.:44.00    3rd Qu.:44.00    3rd Qu.:106.00
## Max.   :59.0    Max.   :59.00    Max.   :59.00    Max.   :121.00
##
##      IDENTIDA_1      TIEMPO      FECH_SIEM      NOM
## 70      : 9    2016-02-12T17:46:53Z: 9    Min.   :2006    ATRAVESAÑO: 24
## 63      : 8    2015-09-30T15:18:46Z: 8    1st Qu.:2010    EL LINERO : 15
## 71      : 8    2015-09-30T16:12:34Z: 8    Median :2012    EL ZAPOTE : 15
## 73      : 8    2015-09-30T16:31:02Z: 8    Mean   :2012    EL MONTE  : 14
## 83      : 8    2015-09-30T17:36:10Z: 8    3rd Qu.:2013    LA TIJERA : 14
## (Other):152    (Other)          :245    Max.   :2015    (Other)   :104
## NA's    :231    NA's            :138    NA's    :35     NA's      :238
##      GRAD_MAD      EDAD      CULT_INTER      ALTURA
## INICIO:123    Min.   :0.000    NO          :161    Min.   :1077
## MADURO: 82    1st Qu.:1.000    0% VEGETACION : 36    1st Qu.:1207
## NULO : 63     Median :3.000    SI           : 30    Median :1232
## PLENO :156    Mean   :3.104    100% VEGETACION : 29    Mean   :1233
##                                     3rd Qu.:4.000    0% OTRA VEGETACION: 22    3rd Qu.:1251
##                                     Max.   :9.000    (Other)       :113    Max.   :1350
##                                     NA's      : 33
##      SUPERF      LONG_      LATIT      N_PUNTO
## Min.   : 0.000    Min.   : 633428    Min.   : 628409    Min.   : 0.00
## 1st Qu.: 0.000    1st Qu.: 635570    1st Qu.: 631222    1st Qu.: 3.00
## Median : 0.000    Median : 639917    Median :2302358    Median :18.00
## Mean   : 1.001    Mean   :1397464    Mean   :1542965    Mean   :20.18
## 3rd Qu.: 0.000    3rd Qu.:2308131    3rd Qu.:2305145    3rd Qu.:34.00
## Max.   :20.700    Max.   :2310671    Max.   :2307679    Max.   :52.00
##
##      VEGETA      PORC_VEG      BUFF_DIST      banda_2      banda_3
## MAIZ : 36    Min.   : 0.00    Min.   :45    Min.   :7720    Min.   :7144
## MALEZA:224    1st Qu.: 0.00    1st Qu.:45    1st Qu.:8283    1st Qu.:7986
## NULO :157    Median : 20.00    Median :45    Median :8380    Median :8131
## NA's : 7     Mean   : 36.04    Mean   :45    Mean   :8390    Mean   :8154
##                                     3rd Qu.: 60.00    3rd Qu.:45    3rd Qu.:8491    3rd Qu.:8302
##                                     Max.   :100.00    Max.   :45    Max.   :8949    Max.   :9084
##
##      banda_4      banda_5      banda_6      banda_7      PRC_VEG_TE

```

```

## Min.      :6571    Min.      : 8306    Min.      : 7702    Min.      : 7351    0 :171
## 1st Qu.:8006    1st Qu.:12648    1st Qu.:10833    1st Qu.: 9370    100: 71
## Median :8246    Median :13410    Median :11910    Median :10052    20 : 56
## Mean      :8304    Mean      :13332    Mean      :11939    Mean      :10089    40 : 51
## 3rd Qu.:8601    3rd Qu.:14122    3rd Qu.:12875    3rd Qu.:10791    50 : 14
## Max.      :9819    Max.      :16770    Max.      :15797    Max.      :13125    60 : 28
##                                     80 : 33
##
##      FID_2      OBJECTID_2      ID      AREA
## Min.      :0.000    Min.      :8857    Min.      :8856    Min.      : 91724772
## 1st Qu.:5.000    1st Qu.:8897    1st Qu.:8896    1st Qu.: 91724772
## Median :5.000    Median :8897    Median :8896    Median : 91724772
## Mean      :4.712    Mean      :8891    Mean      :8890    Mean      :124650952
## 3rd Qu.:5.000    3rd Qu.:8897    3rd Qu.:8896    3rd Qu.:171494647
## Max.      :7.000    Max.      :8901    Max.      :8900    Max.      :214975438
##
##      PERIMETER      NACIONAL_      NACIONAL_I      CLAVE
## Min.      : 53307    Min.      :8858    Min.      :8915    Hh+I+Lc/2/L: 47
## 1st Qu.: 53307    1st Qu.:8898    1st Qu.:8955    Hl+I/2/P : 44
## Median : 53307    Median :8898    Median :8955    I+Hh+Lc/2 : 74
## Mean      : 61586    Mean      :8892    Mean      :8949    I+Re+Hh/2 : 7
## 3rd Qu.: 61754    3rd Qu.:8898    3rd Qu.:8955    Lv+Lc/3 :252
## Max.      :140486    Max.      :8902    Max.      :8959
##
##      FC      NOM_SUE1      NOM_SUB1      NOM_SUE2      NOM_SUB2
## Min.      :20984    Feozem : 91    háptico: 47    Feozem : 74    crómico:252
## 1st Qu.:21801    Litosol: 81    lúvico : 44    Litosol: 91    eútrico: 7
## Median :23473    Luvisol:252    vírtico:252    Luvisol:252    háptico: 74
## Mean      :22681                      NA's : 81    Regosol: 7    NA's : 91
## 3rd Qu.:23473
## Max.      :23473
##
##      NOM_SUE3      NOM_SUB3      CLA_TEX      FAS_FISCA      FAS_QUIMI
## Feozem : 7    crómico:121    Fina :252    Lítica : 47    NA's:424
## Luvisol:121    háptico: 7    Media:172    Pedregosa: 44
## NA's :296    NA's :296                      NA's :333
##
##
##
##      NEWFIELD1      SHAPE_area      SHAPE_len      FID_3
## Min.      :0    Min.      : 91719472    Min.      : 53305    Min.      : 3183
## 1st Qu.:0    1st Qu.: 91719472    1st Qu.: 53305    1st Qu.: 9123
## Median :0    Median : 91719472    Median : 53305    Median : 9123
## Mean      :0    Mean      :124643961    Mean      : 61584    Mean      : 9176
## 3rd Qu.:0    3rd Qu.:171486060    3rd Qu.: 61752    3rd Qu.: 9123
## Max.      :0    Max.      :214963504    Max.      :140482    Max.      :11198
##
##      ID_1      GRIDCODE      Rango
## Min.      : 54268    Min.      :1.000    0-3 :383
## 1st Qu.: 86537    1st Qu.:1.000    12-30: 7
## Median : 86537    Median :1.000    3-12 : 34
## Mean      : 90889    Mean      :1.113
## 3rd Qu.: 86537    3rd Qu.:1.000
## Max.      :153290    Max.      :3.000
##

```

```
summary(mydata2015)
```

```

##      FID_1      FID_1_1      FID_Clip_p      POINTID
## Min.   : 0.0    Min.   : 0.0    Min.   : 0.00    Min.   :145830
## 1st Qu.:105.8    1st Qu.:105.8    1st Qu.: 97.75    1st Qu.:255406
## Median :211.5    Median :211.5    Median :198.50    Median :327261
## Mean   :211.5    Mean   :211.5    Mean   :200.58    Mean   :327966
## 3rd Qu.:317.2    3rd Qu.:317.2    3rd Qu.:304.25    3rd Qu.:393139
## Max.   :423.0    Max.   :423.0    Max.   :410.00    Max.   :557959
##
##      GRID_CODE      FID_Buffer      OBJECTID      IDENTIDAD
## Min.   : 6608    Min.   : 0.00    Min.   : 1.00    70      : 9
## 1st Qu.: 8639    1st Qu.:14.00    1st Qu.: 44.00    63      : 8
## Median : 9318    Median :29.00    Median : 63.00    71      : 8
## Mean   :11460    Mean   :29.18    Mean   : 68.28    73      : 8
## 3rd Qu.:10980    3rd Qu.:44.00    3rd Qu.:106.00    83      : 8
## Max.   :29151    Max.   :59.00    Max.   :121.00    (Other):152
##                                     NA's    :231
##      FID_1_1_1      FID_12      FID_1_1__1      OBJECTID_1
## Min.   : 0.0    Min.   : 0.00    Min.   : 0.00    Min.   : 1.00
## 1st Qu.:14.0    1st Qu.:14.00    1st Qu.:14.00    1st Qu.: 44.00
## Median :29.0    Median :29.00    Median :29.00    Median : 63.00
## Mean   :29.3    Mean   :29.28    Mean   :29.18    Mean   : 68.28
## 3rd Qu.:44.0    3rd Qu.:44.00    3rd Qu.:44.00    3rd Qu.:106.00
## Max.   :59.0    Max.   :59.00    Max.   :59.00    Max.   :121.00
##
##      IDENTIDA_1      TIEMPO      FECH_SIEM      NOM
## 70      : 9    2016-02-12T17:46:53Z: 9    Min.   :2006    ATRAVESAÑO: 24
## 63      : 8    2015-09-30T15:18:46Z: 8    1st Qu.:2010    EL LINERO : 15
## 71      : 8    2015-09-30T16:12:34Z: 8    Median :2012    EL ZAPOTE : 15
## 73      : 8    2015-09-30T16:31:02Z: 8    Mean   :2012    EL MONTE  : 14
## 83      : 8    2015-09-30T17:36:10Z: 8    3rd Qu.:2013    LA TIJERA : 14
## (Other):152    (Other)          :245    Max.   :2015    (Other)   :104
## NA's    :231    NA's            :138    NA's    :35     NA's      :238
##      GRAD_MAD      EDAD      CULT_INTER      ALTURA
## INICIO:123    Min.   :0.000    NO          :161    Min.   :1077
## MADURO: 82    1st Qu.:1.000    0% VEGETACION : 36    1st Qu.:1207
## NULO : 63     Median :3.000    SI          : 30    Median :1232
## PLENO :156    Mean   :3.104    100% VEGETACION : 29    Mean   :1233
##                                     3rd Qu.:4.000    0% OTRA VEGETACION: 22    3rd Qu.:1251
##                                     Max.   :9.000    (Other)      :113    Max.   :1350
##                                     NA's          : 33
##      SUPERF      LONG_      LATIT      N_PUNTO
## Min.   : 0.000    Min.   : 633428    Min.   : 628409    Min.   : 0.00
## 1st Qu.: 0.000    1st Qu.: 635570    1st Qu.: 631222    1st Qu.: 3.00
## Median : 0.000    Median : 639917    Median :2302358    Median :18.00
## Mean   : 1.001    Mean   :1397464    Mean   :1542965    Mean   :20.18
## 3rd Qu.: 0.000    3rd Qu.:2308131    3rd Qu.:2305145    3rd Qu.:34.00
## Max.   :20.700    Max.   :2310671    Max.   :2307679    Max.   :52.00
##
##      VEGETA      PORC_VEG      BUFF_DIST      PRC_VEG_TE      FID_2
## MAIZ : 36    Min.   : 0.00    Min.   :45    0 :171    Min.   :0.000
## MALEZA:224    1st Qu.: 0.00    1st Qu.:45    100: 71    1st Qu.:5.000
## NULO :157    Median : 20.00    Median :45    20 : 56    Median :5.000
## NA's : 7     Mean   : 36.04    Mean   :45    40 : 51    Mean   :4.712
##                                     3rd Qu.: 60.00    3rd Qu.:45    50 : 14    3rd Qu.:5.000
##                                     Max.   :100.00    Max.   :45    60 : 28    Max.   :7.000
##                                     80 : 33
##      OBJECTID_2      ID      AREA      PERIMETER

```



```

## Min.      :8857    Min.      :8856    Min.      : 91724772    Min.      : 53307
## 1st Qu.:8897    1st Qu.:8896    1st Qu.: 91724772    1st Qu.: 53307
## Median :8897    Median :8896    Median : 91724772    Median : 53307
## Mean   :8891    Mean   :8890    Mean   :124650952    Mean   : 61586
## 3rd Qu.:8897    3rd Qu.:8896    3rd Qu.:171494647    3rd Qu.: 61754
## Max.    :8901    Max.    :8900    Max.    :214975438    Max.    :140486
##
## NACIONAL_      NACIONAL_I      CLAVE      FC
## Min.      :8858    Min.      :8915    Hh+I+Lc/2/L: 47    Min.      :20984
## 1st Qu.:8898    1st Qu.:8955    Hl+I/2/P      : 44    1st Qu.:21801
## Median :8898    Median :8955    I+Hh+Lc/2     : 74    Median :23473
## Mean   :8892    Mean   :8949    I+Re+Hh/2     : 7     Mean   :22681
## 3rd Qu.:8898    3rd Qu.:8955    Lv+Lc/3       :252    3rd Qu.:23473
## Max.    :8902    Max.    :8959                      Max.    :23473
##
## NOM_SUE1      NOM_SUB1      NOM_SUE2      NOM_SUB2      NOM_SUE3
## Feozem : 91    háptico: 47    Feozem : 74    crómico:252    Feozem : 7
## Litosol: 81    lúvico : 44    Litosol: 91    eútrico: 7     Luvisol:121
## Luvisol:252    vírtico:252    Luvisol:252    háptico: 74    NA's :296
##                      NA's : 81    Regosol: 7     NA's : 91
##
##
##
## NOM_SUB3      CLA_TEX      FAS_FISCA      FAS_QUIMI      NEWFIELD1
## crómico:121    Fina :252    Lítica : 47    NA's:424    Min. :0
## háptico: 7     Media:172    Pedregosa: 44                      1st Qu.:0
## NA's :296                      NA's :333                      Median :0
##                      Mean :0
##                      3rd Qu.:0
##                      Max. :0
##
## SHAPE_area      SHAPE_len      FID_3      ID_1
## Min. : 91719472    Min. : 53305    Min. : 3183    Min. : 54268
## 1st Qu.: 91719472    1st Qu.: 53305    1st Qu.: 9123    1st Qu.: 86537
## Median : 91719472    Median : 53305    Median : 9123    Median : 86537
## Mean :124643961    Mean : 61584    Mean : 9176    Mean : 90889
## 3rd Qu.:171486060    3rd Qu.: 61752    3rd Qu.: 9123    3rd Qu.: 86537
## Max. :214963504    Max. :140482    Max. :11198    Max. :153290
##
## GRIDCODE      Rango      banda2      banda3      banda4
## Min. :1.000    0-3 :383    Min. :8210    Min. :7698    Min. :7065
## 1st Qu.:1.000    12-30: 7    1st Qu.:8582    1st Qu.:8261    1st Qu.:8013
## Median :1.000    3-12 : 34    Median :8684    Median :8406    Median :8275
## Mean :1.113                      Mean :8673    Mean :8401    Mean :8289
## 3rd Qu.:1.000                      3rd Qu.:8768    3rd Qu.:8554    3rd Qu.:8561
## Max. :3.000                      Max. :9016    Max. :8857    Max. :9242
##
## banda5      banda6      banda7
## Min. :10748    Min. : 8678    Min. : 7576
## 1st Qu.:13673    1st Qu.:11164    1st Qu.: 9151
## Median :14735    Median :12179    Median : 9885
## Mean :14537    Mean :12214    Mean : 9849
## 3rd Qu.:15408    3rd Qu.:13234    3rd Qu.:10533
## Max. :17978    Max. :15614    Max. :12406
##

```

```
summary(mydataFULL)
```

```
##      porc_veg      rango      fech_siem      porc_veg_f
## Min.   : 0.00    0-3 :1149    2011   :255    0 :513
## 1st Qu.: 0.00    12-30: 21    2012   :213    20 :168
## Median : 20.00    3-12 : 102    2013   :183    40 :153
## Mean   : 36.04                    2014   :174    50 : 42
## 3rd Qu.: 60.00                    2010   :123    60 : 84
## Max.   :100.00                    (Other):219    80 : 99
##                                     NA's   :105    100:213
##
##      b2n      b3n      b4n
## Min.   :-659.7250  Min.   :-986.52  Min.   :-1675.18
## 1st Qu.: -98.0012  1st Qu.: -143.31  1st Qu.: -254.48
## Median :  0.0000  Median :  0.00  Median :  0.00
## Mean   :  0.8101  Mean   : 13.97  Mean   :  51.46
## 3rd Qu.: 89.4550  3rd Qu.: 155.52  3rd Qu.: 341.36
## Max.   : 904.3100  Max.   :1584.38  Max.   : 2880.73
##
##      b5n      b6n      b7n      rango_f
## Min.   :-5103.9  Min.   :-4208.2  Min.   :-2700.38  0-3 :1149
## 1st Qu.: -847.7  1st Qu.: -1010.5  1st Qu.: -677.34  3-12 : 102
## Median :  0.0    Median :  0.0    Median :  0.00  12-30: 21
## Mean   : -124.8  Mean   : 111.9  Mean   :  56.09  30-45:  0
## 3rd Qu.: 681.8  3rd Qu.: 1035.5  3rd Qu.: 732.87
## Max.   : 3360.8  Max.   : 6234.9  Max.   : 4132.54
##
##      fech_siem_f
## 2011   :255
## 2012   :213
## 2013   :183
## 2014   :174
## 2010   :123
## (Other):219
## NA's   :105
```

```
# inicio y final de la tabla integrada
head(mydataFULL)
```

```
##      porc_veg rango fech_siem porc_veg_f      b2n      b3n      b4n      b5n
## 1          0  3-12      2013          0    33.97    186.41    589.43   -813.65
## 2          0  3-12      2011          0     7.68     14.78    197.04   -828.05
## 3         20  3-12      2010         20   -24.12    -47.53     34.67   -544.45
## 4         20  3-12      2010         20    33.93     10.98    166.91   -961.85
## 5          0  3-12      2010          0  -181.33   -295.75   -559.35   1598.85
## 6          0  3-12      2013          0     6.33    138.98    620.94  -1327.35
##
##      b6n      b7n rango_f fech_siem_f
## 1    816.1    836.24   3-12      2013
## 2  -1532.6   -444.77   3-12      2011
## 3     39.7     50.24   3-12      2010
## 4   -235.8    -4.00   3-12      2010
## 5   -813.2  -1120.21   3-12      2010
## 6    552.1    929.84   3-12      2013
```

```
tail(mydataFULL)
```

##	porc_veg	rango	fecha_siem	porc_veg_f	b2n	b3n	b4n	b5n
## 1267	40	3-12	2011	40	-67.69	-35.255	-56.35	2643.05
## 1268	40	3-12	2011	40	-96.90	7.415	39.14	3243.05
## 1269	40	3-12	2011	40	38.63	227.015	345.35	2818.45
## 1270	40	3-12	2011	40	-13.79	45.505	38.10	-24.85
## 1271	40	3-12	2011	40	-54.46	-12.045	-7.94	445.55
## 1272	20	3-12	2012	20	253.25	389.875	596.13	-675.55
##	b6n	b7n	rango_f	fecha_siem_f				
## 1267	871.2	-213.45	3-12	2011				
## 1268	61.0	-442.77	3-12	2011				
## 1269	885.2	-192.19	3-12	2011				
## 1270	-97.0	-312.00	3-12	2011				
## 1271	-497.3	-604.31	3-12	2011				
## 1272	792.9	758.93	3-12	2012				