# Step 2: Estimating germination rates from the cumulative germination curves

# Test the fit of different cumulative germination functions to your germination curves

FS <- function(x) {

fits <- drm(G/PG ~ Time, data = x, type = "binomial", fct = LL.2())

selected <- mselect(fits, list(LL.2(), LL.5(), W1.4(), W2.2(),

LL2.2(),

LL2.5(), AR.2(), MM.2(), MM.3()),

nested = FALSE, sorted = c("IC", "Res var",

"Lack of fit", "no"), linreg = F, icfct = AIC)

row.names(selected)[1]

}

FSfit<-ddply(data, .(Grouping, Treatment), failwith(f = FS, quiet = T))

# Plot cumulative germination and check function fit visually

# If using any dataset other than the example dataset, take

#action here and change 'fct=LL.2()' to.....

CGfun <- function(x) {

fit <- drm(G/PG ~ Time, data = x, type = "binomial", fct = LL.2())

demo.fits <- expand.grid(conc = exp(seq(log(1.00e-04),

log(max(data$Time)),

length = 100)))

pm <- predict(fit, newdata = demo.fits, interval = "confidence")

data.frame(demo.fits$conc, pm)

}

CGfit <- ddply(data, .(Grouping, Treatment), failwith(f = CGfun, quiet = T))

data$Time1 <- data$Time

data$Time1[data$Time1 == 0] <- 1.00e-09

# Create a figure plotting all of your germination curves by treatment for every treatment

# by grouping and call the figure 'CGfig'

CGfig <- ggplot(data, aes(x = Time1, y = G/PG)) +

geom\_point(size=0.8, alpha = 0.5) +

geom\_line(data = CGfit,

aes( x = demo.fits.conc, y = Prediction)) +

geom\_ribbon(data = CGfit,

aes(x = demo.fits.conc, y = Prediction,

ymin = Lower, ymax = Upper),

alpha = 0.2) +

facet\_grid(Treatment ~ Grouping) +

theme\_bw() + theme(panel.grid.major = element\_blank(),

panel.grid.minor = element\_blank(),

strip.background = element\_rect(colour="black", fill="white")) +

labs(x="Time",y="Final germination proportions")

# Look at Figure 2: CGfig

CGfig

# Save Figure 2: CGfig to a '.tiff' file in your working directory

ggsave(filename = "Fig 2 Cumulative germination curves.tiff", plot = CGfig,

path = NULL, scale = 1, width = 173, height = 173,

units = "mm", dpi = 300)