

WK14

2025-10-01

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v dplyr      1.1.4      v readr      2.1.5
## v forcats    1.0.0      v stringr   1.5.1
## v ggplot2    3.5.2      v tibble    3.2.1
## v lubridate  1.9.4      v tidyr     1.3.1
## v purrr      1.0.4
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(readxl)
library(lubridate)
library(janitor)
```

```
##
## Attaching package: 'janitor'
##
## The following objects are masked from 'package:stats':
##
##      chisq.test, fisher.test
```

```
library(purrr)
library(readr)
library(ggthemes)
library(ggeffects)
library(lme4)
```

```
## Loading required package: Matrix
##
## Attaching package: 'Matrix'
##
## The following objects are masked from 'package:tidyr':
##
##      expand, pack, unpack
```

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

mixed-effect model by including time as fixed-effect for 2022 to 2023

```
pl_lt <- read.csv("Data/pl_lt.csv") %>% mutate(survey_date = as.Date(survey_date))
pl_lt <- pl_lt %>%
  arrange(survey_date) %>%
  mutate(
    week = as.integer((as.numeric(survey_date - min(survey_date)) %/% 7) + 1)
  )
pl_lt_t.lmer <- lmer(
  daily_growth ~ mean_light_ly_day2 + week + (1 + mean_light_ly_day2 + week | pop),
  data = pl_lt, REML = TRUE
)
```

```
## boundary (singular) fit: see help('isSingular')
```

```
summary (pl_lt_t.lmer)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: daily_growth ~ mean_light_ly_day2 + week + (1 + mean_light_ly_day2 +
##      week | pop)
## Data: pl_lt
##
## REML criterion at convergence: 1645
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -4.1540 -0.3029 -0.0403  0.1390  8.5161
##
## Random effects:
##      Groups   Name                Variance Std.Dev. Corr
##      pop      (Intercept)         4.836e-02 0.219917
##              mean_light_ly_day2  1.110e-02 0.105341  0.99
##              week                9.002e-05 0.009488 -0.77 -0.85
## Residual                    1.125e-01 0.335340
## Number of obs: 2415, groups:  pop, 23
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    0.113464   0.069105   1.642
## mean_light_ly_day2 0.068149   0.033768   2.018
## week           0.001722   0.003951   0.436
##
## Correlation of Fixed Effects:
##              (Intr) mn___2
## mn_lght_l_2  0.976
## week        -0.834 -0.836
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

mixed-effect model for 2023

```
plant_with_light <- read.csv("Data/plant_with_light.csv") %>% mutate(survey_date = as.Date(survey_date))
plant_with_light <- plant_with_light %>%
  arrange(survey_date) %>%
```

```

mutate(
  week = as.integer((as.numeric(survey_date - min(survey_date)) %% 7) + 1)
)
growth_light_time.lmer <- lmer(
  daily_growth ~ weekly_avg_SlrW2 + week + (1 + weekly_avg_SlrW2 + week | parent_pop),
  data = plant_with_light, REML = TRUE
)

```

```

## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, :
## Model failed to converge with max|grad| = 0.0119036 (tol = 0.002, component 1)

```

```

summary(growth_light_time.lmer)

```

```

## Linear mixed model fit by REML ['lmerMod']
## Formula: daily_growth ~ weekly_avg_SlrW2 + week + (1 + weekly_avg_SlrW2 +
##      week | parent_pop)
## Data: plant_with_light
##
## REML criterion at convergence: -6528.8
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -6.2030 -0.4721  0.0031  0.4375  8.4259
##
## Random effects:
##   Groups      Name                Variance Std.Dev. Corr
##   parent_pop (Intercept)          6.276e-03 0.07922
##              weekly_avg_SlrW2    4.461e-04 0.02112  -0.70
##              week                7.414e-05 0.00861  -0.87  0.76
## Residual                        1.877e-02 0.13701
## Number of obs: 5870, groups: parent_pop, 22
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)    0.004437   0.018561   0.239
## weekly_avg_SlrW2 0.029441   0.005649   5.212
## week           0.001841   0.002133   0.863
##
## Correlation of Fixed Effects:
##              (Intr) w__SW2
## wkly_vg_SW2 -0.702
## week        -0.887  0.762
## optimizer (nloptwrap) convergence code: 0 (OK)
## Model failed to converge with max|grad| = 0.0119036 (tol = 0.002, component 1)

```