Flowering 6CV

CT

Thursday, December 31, 2015

library(tidyr)  
library (dplyr)

##   
## Attaching package: 'dplyr'

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

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

library (ggplot2)  
library(agricolae)  
library(knitr)  
library (lubridate)

##   
## Attaching package: 'lubridate'

## The following object is masked from 'package:base':  
##   
## date

setwd("C:\\Users\\EdCarmen\\Documents\\CarmenProjects2016\\GitSubclover")  
getwd()

## [1] "C:/Users/EdCarmen/Documents/CarmenProjects2016/GitSubclover"

#create file  
df\_flower <- read.table("F\_Flower\_SB\_PhenologyData.txt",header=TRUE)  
  
head(df\_flower)

## ï..Cultivar SowTreat SowingD DAS Date Plot Variable S1 S2 S3 S4  
## 1 Antas S1 24/06/2015 110 12/10/2015 1 Bud 0 0 0 0  
## 2 Antas S1 24/06/2015 110 12/10/2015 1 Early 0 0 0 0  
## 3 Antas S1 24/06/2015 110 12/10/2015 1 Open 0 0 0 0  
## 4 Antas S1 24/06/2015 110 12/10/2015 1 Petal 0 0 0 0  
## 5 Antas S1 24/06/2015 110 12/10/2015 1 Bur1 0 0 0 0  
## 6 Antas S1 24/06/2015 110 12/10/2015 1 Bur2 0 0 0 0  
## S5  
## 1 0  
## 2 0  
## 3 0  
## 4 0  
## 5 0  
## 6 0

summary(df\_flower)

## ï..Cultivar SowTreat SowingD DAS   
## Antas :4076 S6 :4894 17/02/2016:4894 Min. : 49.0   
## Denmark :4083 S7 :3476 15/03/2016:3476 1st Qu.: 99.0   
## Leura :4075 S3 :3006 15/09/2015:3006 Median :146.0   
## Monti :4077 S4 :2979 5/11/2015 :2979 Mean :145.7   
## Narrikup :4083 S2 :2665 28/07/2015:2665 3rd Qu.:183.0   
## Woogenellup:4078 S5 :2592 15/12/2015:2592 Max. :279.0   
## (Other):4860 (Other) :4860   
## Date Plot Variable S1   
## 4/01/2016 : 576 Min. : 1.0 Bur2 :3088 Min. :0.0000   
## 6/05/2016 : 576 1st Qu.: 42.0 Bur1 :3075 1st Qu.:0.0000   
## 10/10/2016: 432 Median : 80.0 Bud :3074 Median :0.0000   
## 10/12/2015: 432 Mean : 75.3 Early :3074 Mean :0.2273   
## 14/10/2016: 432 3rd Qu.:107.0 Petal :3074 3rd Qu.:0.0000   
## 15/09/2016: 432 Max. :144.0 Open :3073 Max. :1.0000   
## (Other) :21592 (Other):6014 NA's :424   
## S2 S3 S4 S5   
## Min. :0.0000 Min. :0.0000 Min. :0.0000 Min. :0.0000   
## 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000   
## Median :0.0000 Median :0.0000 Median :0.0000 Median :0.0000   
## Mean :0.2237 Mean :0.2166 Mean :0.2105 Mean :0.2057   
## 3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.0000   
## Max. :1.0000 Max. :1.0000 Max. :1.0000 Max. :1.0000   
## NA's :424 NA's :424 NA's :424 NA's :424

colnames(df\_flower)[1] <- "Cultivar" # fix bug of extra characters in name  
# convert to date format  
df\_flower <- df\_flower %>%  
mutate(Date=dmy(Date),SowingD=dmy(SowingD),   
 Percent=(S1+S2+S3+S4+S5)/5\*100)  
str(df\_flower)

## 'data.frame': 24472 obs. of 13 variables:  
## $ Cultivar: Factor w/ 6 levels "Antas","Denmark",..: 1 1 1 1 1 1 1 1 4 4 ...  
## $ SowTreat: Factor w/ 8 levels "S1","S2","S3",..: 1 1 1 1 1 1 1 1 1 1 ...  
## $ SowingD : Date, format: "2015-06-24" "2015-06-24" ...  
## $ DAS : int 110 110 110 110 110 110 110 110 110 110 ...  
## $ Date : Date, format: "2015-10-12" "2015-10-12" ...  
## $ Plot : int 1 1 1 1 1 1 1 1 2 2 ...  
## $ Variable: Factor w/ 8 levels "Bud","Bur1","Bur2",..: 1 6 7 8 2 3 4 5 1 6 ...  
## $ S1 : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ S2 : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ S3 : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ S4 : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ S5 : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ Percent : num 0 0 0 0 0 0 0 0 0 0 ...

head(df\_flower)

## Cultivar SowTreat SowingD DAS Date Plot Variable S1 S2 S3 S4 S5  
## 1 Antas S1 2015-06-24 110 2015-10-12 1 Bud 0 0 0 0 0  
## 2 Antas S1 2015-06-24 110 2015-10-12 1 Early 0 0 0 0 0  
## 3 Antas S1 2015-06-24 110 2015-10-12 1 Open 0 0 0 0 0  
## 4 Antas S1 2015-06-24 110 2015-10-12 1 Petal 0 0 0 0 0  
## 5 Antas S1 2015-06-24 110 2015-10-12 1 Bur1 0 0 0 0 0  
## 6 Antas S1 2015-06-24 110 2015-10-12 1 Bur2 0 0 0 0 0  
## Percent  
## 1 0  
## 2 0  
## 3 0  
## 4 0  
## 5 0  
## 6 0

summary(df\_flower)

## Cultivar SowTreat SowingD DAS   
## Antas :4076 S6 :4894 Min. :2015-06-24 Min. : 49.0   
## Denmark :4083 S7 :3476 1st Qu.:2015-09-15 1st Qu.: 99.0   
## Leura :4075 S3 :3006 Median :2015-12-15 Median :146.0   
## Monti :4077 S4 :2979 Mean :2015-12-04 Mean :145.7   
## Narrikup :4083 S2 :2665 3rd Qu.:2016-02-17 3rd Qu.:183.0   
## Woogenellup:4078 S5 :2592 Max. :2016-05-04 Max. :279.0   
## (Other):4860   
## Date Plot Variable S1   
## Min. :2015-10-12 Min. : 1.0 Bur2 :3088 Min. :0.0000   
## 1st Qu.:2015-12-27 1st Qu.: 42.0 Bur1 :3075 1st Qu.:0.0000   
## Median :2016-03-12 Median : 80.0 Bud :3074 Median :0.0000   
## Mean :2016-04-28 Mean : 75.3 Early :3074 Mean :0.2273   
## 3rd Qu.:2016-09-15 3rd Qu.:107.0 Petal :3074 3rd Qu.:0.0000   
## Max. :2016-11-23 Max. :144.0 Open :3073 Max. :1.0000   
## (Other):6014 NA's :424   
## S2 S3 S4 S5   
## Min. :0.0000 Min. :0.0000 Min. :0.0000 Min. :0.0000   
## 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000   
## Median :0.0000 Median :0.0000 Median :0.0000 Median :0.0000   
## Mean :0.2237 Mean :0.2166 Mean :0.2105 Mean :0.2057   
## 3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.0000   
## Max. :1.0000 Max. :1.0000 Max. :1.0000 Max. :1.0000   
## NA's :424 NA's :424 NA's :424 NA's :424   
## Percent   
## Min. : 0.00   
## 1st Qu.: 0.00   
## Median : 0.00   
## Mean : 21.68   
## 3rd Qu.: 40.00   
## Max. :100.00   
## NA's :424

tail(df\_flower)

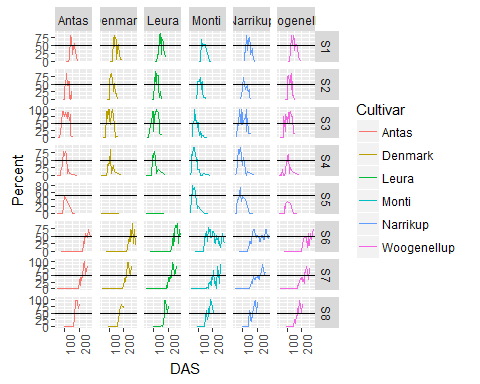
## Cultivar SowTreat SowingD DAS Date Plot Variable S1 S2 S3  
## 24467 Narrikup S8 2016-05-04 203 2016-11-23 144 Open 1 1 1  
## 24468 Narrikup S8 2016-05-04 203 2016-11-23 144 Petal 1 1 1  
## 24469 Narrikup S8 2016-05-04 203 2016-11-23 144 Bur1 1 1 1  
## 24470 Narrikup S8 2016-05-04 203 2016-11-23 144 Bur2 1 1 1  
## 24471 Narrikup S8 2016-05-04 203 2016-11-23 144 Bur3 1 1 0  
## 24472 Narrikup S8 2016-05-04 203 2016-11-23 144 Bur4 0 0 0  
## S4 S5 Percent  
## 24467 1 1 100  
## 24468 1 1 100  
## 24469 1 1 100  
## 24470 1 1 100  
## 24471 0 0 40  
## 24472 0 0 0

Analysis of sowing date and cultivars for Bud considering Date

head(df\_flower)

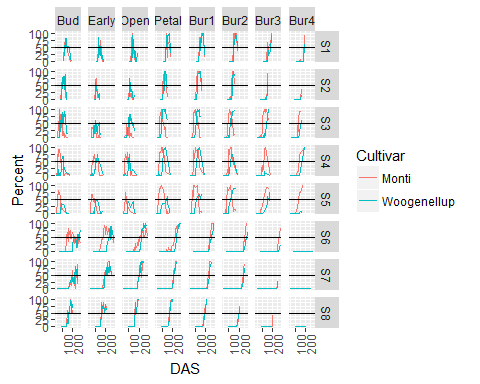
## Cultivar SowTreat SowingD DAS Date Plot Variable S1 S2 S3 S4 S5  
## 1 Antas S1 2015-06-24 110 2015-10-12 1 Bud 0 0 0 0 0  
## 2 Antas S1 2015-06-24 110 2015-10-12 1 Early 0 0 0 0 0  
## 3 Antas S1 2015-06-24 110 2015-10-12 1 Open 0 0 0 0 0  
## 4 Antas S1 2015-06-24 110 2015-10-12 1 Petal 0 0 0 0 0  
## 5 Antas S1 2015-06-24 110 2015-10-12 1 Bur1 0 0 0 0 0  
## 6 Antas S1 2015-06-24 110 2015-10-12 1 Bur2 0 0 0 0 0  
## Percent  
## 1 0  
## 2 0  
## 3 0  
## 4 0  
## 5 0  
## 6 0

df\_flower %>%  
 group\_by(DAS,Date, Cultivar,SowTreat,Variable)%>%  
 summarise\_each(funs(mean)) %>%  
 select(Variable,Percent, Cultivar,Date,SowTreat)%>%  
 filter(Variable == "Bud") %>%  
 ggplot(aes(x=DAS, y=Percent)) +   
 geom\_line(aes(colour=Cultivar)) +  
 facet\_grid(SowTreat~Cultivar, scales = "free")+  
 #facet\_grid(Cultivar~., scales = "free")+  
 geom\_abline(intercept = 50, slope = 0) +  
 theme(axis.text.x = element\_text(angle = 90, hjust = 1))



Analysis of Sowing dates and variables (from bud to bur4) considering DAS

df\_flower %>%  
 #filter(SowTreat != "S6" & SowTreat != "S7")%>%  
 mutate(Variable =   
 factor(Variable,levels = c("Bud","Early","Open",  
 "Petal","Bur1","Bur2","Bur3","Bur4" ))) %>%  
 group\_by(DAS,Cultivar,SowTreat,Variable) %>%  
 summarise\_each(funs(mean)) %>%  
 select(Variable,Percent, Cultivar,DAS,SowTreat) %>%  
 filter(Cultivar == "Monti" | Cultivar =="Woogenellup") %>%  
 ggplot(aes(x=DAS, y=Percent)) +   
 #geom\_bar(shape=1, stat="identity")  
 geom\_line(aes(colour=Cultivar)) +  
 facet\_grid(SowTreat~Variable, scales = "free") +  
 geom\_abline(intercept = 50, slope = 0)+  
   
theme(axis.text.x = element\_text(angle = 90, hjust = 1))



Read Thermal Sum data. Need to include these values before 30 06 :

"1",2015-06-24,13.055375,13.055375 "2",2015-06-25,12.44417391,25.49954891 "3",2015-06-26,10.65429167,36.15384058 "4",2015-06-27,10.04670833,46.20054891 "5",2015-06-28,6.950333333,53.150882243 "6",2015-06-29,9.378291667,62.52917391 "

# read raw data  
  
#Temperatures from 24 June to 29 June included from Broadfield Niwa in excel Datalogger folder Thermal Sum is created in the the Thermal time project (R file)   
  
  
  
   
df\_TTSum <- read.table("ThermalSum.txt",header=TRUE)  
summary(df\_TTSum)

## Date TT   
## 2015-06-24: 1 Min. : 13.05   
## 2015-06-25: 1 1st Qu.: 914.75   
## 2015-06-26: 1 Median :2465.83   
## 2015-06-27: 1 Mean :2524.42   
## 2015-06-28: 1 3rd Qu.:4195.86   
## 2015-06-29: 1 Max. :5042.63   
## (Other) :429

tail(df\_TTSum)

## Date TT  
## 430 2016-08-26 4996.421  
## 431 2016-08-27 5003.175  
## 432 2016-08-28 5011.661  
## 433 2016-08-29 5024.624  
## 434 2016-08-30 5034.821  
## 435 2016-08-31 5042.627

# convert to date format  
df\_TTSum <- df\_TTSum %>%  
 mutate(Date=ymd(Date))  
  
# remove extra columns  
#df\_TTSum <- df\_TTSum %>%  
 #dplyr::select(-MeanAirT)  
  
# check  
head(df\_TTSum)

## Date TT  
## 1 2015-06-24 13.05537  
## 2 2015-06-25 25.49955  
## 3 2015-06-26 36.12669  
## 4 2015-06-27 46.12669  
## 5 2015-06-28 53.05186  
## 6 2015-06-29 62.42601

summary(df\_TTSum )

## Date TT   
## Min. :2015-06-24 Min. : 13.05   
## 1st Qu.:2015-10-10 1st Qu.: 914.75   
## Median :2016-01-27 Median :2465.83   
## Mean :2016-01-27 Mean :2524.42   
## 3rd Qu.:2016-05-14 3rd Qu.:4195.86   
## Max. :2016-08-31 Max. :5042.63

names(df\_TTSum)

## [1] "Date" "TT"

str(df\_TTSum$Date)

## Date[1:435], format: "2015-06-24" "2015-06-25" "2015-06-26" "2015-06-27" ...

tail(df\_TTSum)

## Date TT  
## 430 2016-08-26 4996.421  
## 431 2016-08-27 5003.175  
## 432 2016-08-28 5011.661  
## 433 2016-08-29 5024.624  
## 434 2016-08-30 5034.821  
## 435 2016-08-31 5042.627

Merge dfs TTSum at Measurement and Sowing Date into Flowering df

# Add Tt at measurement date  
df\_flower <- merge(df\_flower,df\_TTSum,by="Date")  
  
# change name TT to TT at measurement  
df\_flower <- df\_flower %>%  
rename(TT\_meas = TT)  
head(df\_flower)

## Date Cultivar SowTreat SowingD DAS Plot Variable S1 S2 S3 S4 S5  
## 1 2015-10-12 Leura S1 2015-06-24 110 18 Bud 0 0 0 0 0  
## 2 2015-10-12 Leura S1 2015-06-24 110 18 Early 0 0 0 0 0  
## 3 2015-10-12 Leura S1 2015-06-24 110 18 Open 0 0 0 0 0  
## 4 2015-10-12 Leura S1 2015-06-24 110 18 Bur1 0 0 0 0 0  
## 5 2015-10-12 Leura S1 2015-06-24 110 18 Bur2 0 0 0 0 0  
## 6 2015-10-12 Leura S1 2015-06-24 110 18 Bur3 0 0 0 0 0  
## Percent TT\_meas  
## 1 0 936.574  
## 2 0 936.574  
## 3 0 936.574  
## 4 0 936.574  
## 5 0 936.574  
## 6 0 936.574

# Add Tt at sowing date  
df\_TTSum\_mod <- df\_TTSum %>%  
 mutate (SowingD = Date) %>%  
 dplyr::select (-Date)  
  
df\_flower <- merge(df\_flower,df\_TTSum\_mod, by = "SowingD")  
  
# change name TT to TT at measurement  
df\_flower <- df\_flower %>%  
rename(TT\_sow = TT)  
head(df\_flower)

## SowingD Date Cultivar SowTreat DAS Plot Variable S1 S2 S3 S4 S5  
## 1 2015-06-24 2015-10-12 Leura S1 110 18 Bud 0 0 0 0 0  
## 2 2015-06-24 2015-10-12 Leura S1 110 18 Early 0 0 0 0 0  
## 3 2015-06-24 2015-10-12 Leura S1 110 18 Open 0 0 0 0 0  
## 4 2015-06-24 2015-10-12 Leura S1 110 18 Bur1 0 0 0 0 0  
## 5 2015-06-24 2015-10-12 Leura S1 110 18 Bur2 0 0 0 0 0  
## 6 2015-06-24 2015-10-12 Leura S1 110 18 Bur3 0 0 0 0 0  
## Percent TT\_meas TT\_sow  
## 1 0 936.574 13.05537  
## 2 0 936.574 13.05537  
## 3 0 936.574 13.05537  
## 4 0 936.574 13.05537  
## 5 0 936.574 13.05537  
## 6 0 936.574 13.05537

#check  
head(df\_flower)

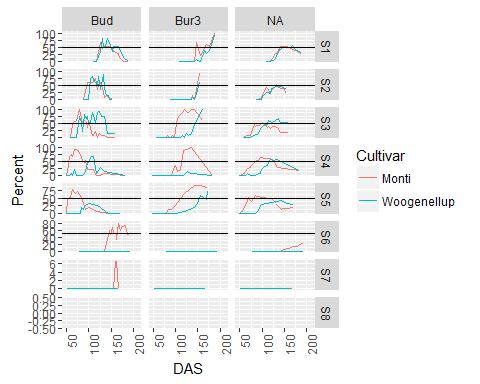
## SowingD Date Cultivar SowTreat DAS Plot Variable S1 S2 S3 S4 S5  
## 1 2015-06-24 2015-10-12 Leura S1 110 18 Bud 0 0 0 0 0  
## 2 2015-06-24 2015-10-12 Leura S1 110 18 Early 0 0 0 0 0  
## 3 2015-06-24 2015-10-12 Leura S1 110 18 Open 0 0 0 0 0  
## 4 2015-06-24 2015-10-12 Leura S1 110 18 Bur1 0 0 0 0 0  
## 5 2015-06-24 2015-10-12 Leura S1 110 18 Bur2 0 0 0 0 0  
## 6 2015-06-24 2015-10-12 Leura S1 110 18 Bur3 0 0 0 0 0  
## Percent TT\_meas TT\_sow  
## 1 0 936.574 13.05537  
## 2 0 936.574 13.05537  
## 3 0 936.574 13.05537  
## 4 0 936.574 13.05537  
## 5 0 936.574 13.05537  
## 6 0 936.574 13.05537

summary(df\_flower )

## SowingD Date Cultivar   
## Min. :2015-06-24 Min. :2015-10-12 Antas :2876   
## 1st Qu.:2015-07-28 1st Qu.:2015-12-10 Denmark :2883   
## Median :2015-11-05 Median :2016-01-21 Leura :2875   
## Mean :2015-10-20 Mean :2016-02-18 Monti :2877   
## 3rd Qu.:2015-12-15 3rd Qu.:2016-05-06 Narrikup :2883   
## Max. :2016-05-04 Max. :2016-08-30 Woogenellup:2878   
##   
## SowTreat DAS Plot Variable   
## S3 :3006 Min. : 49 Min. : 1.00 Bur2 :2188   
## S4 :2979 1st Qu.: 89 1st Qu.: 30.00 Bur1 :2175   
## S2 :2665 Median :119 Median : 57.00 Bud :2174   
## S5 :2592 Mean :121 Mean : 58.01 Early :2174   
## S1 :2556 3rd Qu.:155 3rd Qu.: 85.00 Petal :2174   
## S6 :2446 Max. :211 Max. :144.00 Open :2173   
## (Other):1028 (Other):4214   
## S1 S2 S3 S4   
## Min. :0.0000 Min. :0.0000 Min. :0.0000 Min. :0.0000   
## 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000   
## Median :0.0000 Median :0.0000 Median :0.0000 Median :0.0000   
## Mean :0.2063 Mean :0.2061 Mean :0.2034 Mean :0.2025   
## 3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.0000   
## Max. :1.0000 Max. :1.0000 Max. :1.0000 Max. :1.0000   
## NA's :424 NA's :424 NA's :424 NA's :424   
## S5 Percent TT\_meas TT\_sow   
## Min. :0.000 Min. : 0.00 Min. : 936.6 Min. : 13.05   
## 1st Qu.:0.000 1st Qu.: 0.00 1st Qu.:1722.5 1st Qu.: 275.03   
## Median :0.000 Median : 0.00 Median :2345.7 Median :1216.14   
## Mean :0.202 Mean : 20.41 Mean :2729.4 Mean :1240.97   
## 3rd Qu.:0.000 3rd Qu.: 40.00 3rd Qu.:4064.6 3rd Qu.:1798.60   
## Max. :1.000 Max. :100.00 Max. :5034.8 Max. :4038.56   
## NA's :424 NA's :424

#aqi  
# TT from Bud to Bur 3   
  
df\_flower %>%  
 #filter(SowTreat != "S6" & SowTreat != "S7")%>%  
 mutate(Variable =   
 factor(Variable,levels = c("Bud","Bur3"))) %>%  
 group\_by(DAS,Cultivar,SowTreat,Variable) %>%  
 summarise\_each(funs(mean)) %>%  
 select(Variable,Percent, Cultivar,SowTreat) %>%  
 filter(Cultivar == "Monti" | Cultivar =="Woogenellup") %>%  
 ggplot(aes(x=DAS, y=Percent)) +   
 #geom\_bar(shape=1, stat="identity")  
 geom\_line(aes(colour=Cultivar)) +  
 facet\_grid(SowTreat~Variable, scales = "free") +  
 geom\_abline(intercept = 50, slope = 0)+  
   
theme(axis.text.x = element\_text(angle = 90, hjust = 1))

## geom\_path: Each group consists of only one observation. Do you need to  
## adjust the group aesthetic?  
## geom\_path: Each group consists of only one observation. Do you need to  
## adjust the group aesthetic?  
## geom\_path: Each group consists of only one observation. Do you need to  
## adjust the group aesthetic?



Include Photoperiod at sowing date in main df

#create file  
df\_Photo <- read.table("Photoperiod.txt",header=TRUE)  
  
# convert to date format  
df\_Photo <- df\_Photo %>%  
mutate(Date=dmy(Date))  
head(df\_Photo)

## Date Pp  
## 1 2015-01-01 16.574  
## 2 2015-01-02 16.560  
## 3 2015-01-03 16.545  
## 4 2015-01-04 16.528  
## 5 2015-01-05 16.511  
## 6 2015-01-06 16.492

# rename date column for merge  
df\_Photo <- df\_Photo %>%  
rename(SowingD = Date)  
head(df\_Photo)

## SowingD Pp  
## 1 2015-01-01 16.574  
## 2 2015-01-02 16.560  
## 3 2015-01-03 16.545  
## 4 2015-01-04 16.528  
## 5 2015-01-05 16.511  
## 6 2015-01-06 16.492

#Add Pp to df\_flower (merge by SowinD)  
df\_flower <- merge(df\_flower,df\_Photo,by="SowingD")  
head(df\_flower)

## SowingD Date Cultivar SowTreat DAS Plot Variable S1 S2 S3 S4 S5  
## 1 2015-06-24 2015-10-12 Leura S1 110 18 Bud 0 0 0 0 0  
## 2 2015-06-24 2015-10-12 Leura S1 110 18 Early 0 0 0 0 0  
## 3 2015-06-24 2015-10-12 Leura S1 110 18 Open 0 0 0 0 0  
## 4 2015-06-24 2015-10-12 Leura S1 110 18 Bur1 0 0 0 0 0  
## 5 2015-06-24 2015-10-12 Leura S1 110 18 Bur2 0 0 0 0 0  
## 6 2015-06-24 2015-10-12 Leura S1 110 18 Bur3 0 0 0 0 0  
## Percent TT\_meas TT\_sow Pp  
## 1 0 936.574 13.05537 10.022  
## 2 0 936.574 13.05537 10.022  
## 3 0 936.574 13.05537 10.022  
## 4 0 936.574 13.05537 10.022  
## 5 0 936.574 13.05537 10.022  
## 6 0 936.574 13.05537 10.022

summary(df\_flower)

## SowingD Date Cultivar   
## Min. :2015-06-24 Min. :2015-10-12 Antas :2876   
## 1st Qu.:2015-07-28 1st Qu.:2015-12-10 Denmark :2883   
## Median :2015-11-05 Median :2016-01-21 Leura :2875   
## Mean :2015-10-20 Mean :2016-02-18 Monti :2877   
## 3rd Qu.:2015-12-15 3rd Qu.:2016-05-06 Narrikup :2883   
## Max. :2016-05-04 Max. :2016-08-30 Woogenellup:2878   
##   
## SowTreat DAS Plot Variable   
## S3 :3006 Min. : 49 Min. : 1.00 Bur2 :2188   
## S4 :2979 1st Qu.: 89 1st Qu.: 30.00 Bur1 :2175   
## S2 :2665 Median :119 Median : 57.00 Bud :2174   
## S5 :2592 Mean :121 Mean : 58.01 Early :2174   
## S1 :2556 3rd Qu.:155 3rd Qu.: 85.00 Petal :2174   
## S6 :2446 Max. :211 Max. :144.00 Open :2173   
## (Other):1028 (Other):4214   
## S1 S2 S3 S4   
## Min. :0.0000 Min. :0.0000 Min. :0.0000 Min. :0.0000   
## 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000   
## Median :0.0000 Median :0.0000 Median :0.0000 Median :0.0000   
## Mean :0.2063 Mean :0.2061 Mean :0.2034 Mean :0.2025   
## 3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.0000   
## Max. :1.0000 Max. :1.0000 Max. :1.0000 Max. :1.0000   
## NA's :424 NA's :424 NA's :424 NA's :424   
## S5 Percent TT\_meas TT\_sow   
## Min. :0.000 Min. : 0.00 Min. : 936.6 Min. : 13.05   
## 1st Qu.:0.000 1st Qu.: 0.00 1st Qu.:1722.5 1st Qu.: 275.03   
## Median :0.000 Median : 0.00 Median :2345.7 Median :1216.14   
## Mean :0.202 Mean : 20.41 Mean :2729.4 Mean :1240.97   
## 3rd Qu.:0.000 3rd Qu.: 40.00 3rd Qu.:4064.6 3rd Qu.:1798.60   
## Max. :1.000 Max. :100.00 Max. :5034.8 Max. :4038.56   
## NA's :424 NA's :424   
## Pp   
## Min. :10.02   
## 1st Qu.:10.62   
## Median :13.48   
## Mean :13.37   
## 3rd Qu.:15.36   
## Max. :16.61   
##

# change name PP to PP at sowing date  
df\_flower <- df\_flower %>%  
rename(Pp\_sow = Pp)  
head(df\_flower)

## SowingD Date Cultivar SowTreat DAS Plot Variable S1 S2 S3 S4 S5  
## 1 2015-06-24 2015-10-12 Leura S1 110 18 Bud 0 0 0 0 0  
## 2 2015-06-24 2015-10-12 Leura S1 110 18 Early 0 0 0 0 0  
## 3 2015-06-24 2015-10-12 Leura S1 110 18 Open 0 0 0 0 0  
## 4 2015-06-24 2015-10-12 Leura S1 110 18 Bur1 0 0 0 0 0  
## 5 2015-06-24 2015-10-12 Leura S1 110 18 Bur2 0 0 0 0 0  
## 6 2015-06-24 2015-10-12 Leura S1 110 18 Bur3 0 0 0 0 0  
## Percent TT\_meas TT\_sow Pp\_sow  
## 1 0 936.574 13.05537 10.022  
## 2 0 936.574 13.05537 10.022  
## 3 0 936.574 13.05537 10.022  
## 4 0 936.574 13.05537 10.022  
## 5 0 936.574 13.05537 10.022  
## 6 0 936.574 13.05537 10.022

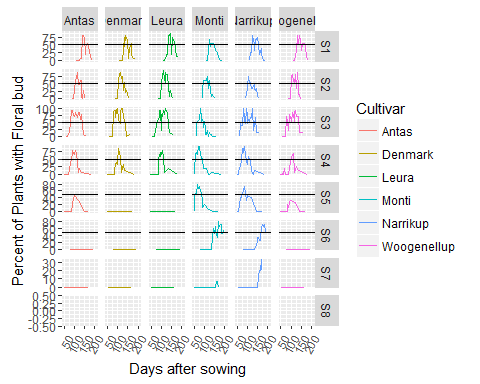
calculate TT after sowing

df\_flower$TTAS <- df\_flower$TT\_meas-df\_flower$TT\_sow  
head(df\_flower)

## SowingD Date Cultivar SowTreat DAS Plot Variable S1 S2 S3 S4 S5  
## 1 2015-06-24 2015-10-12 Leura S1 110 18 Bud 0 0 0 0 0  
## 2 2015-06-24 2015-10-12 Leura S1 110 18 Early 0 0 0 0 0  
## 3 2015-06-24 2015-10-12 Leura S1 110 18 Open 0 0 0 0 0  
## 4 2015-06-24 2015-10-12 Leura S1 110 18 Bur1 0 0 0 0 0  
## 5 2015-06-24 2015-10-12 Leura S1 110 18 Bur2 0 0 0 0 0  
## 6 2015-06-24 2015-10-12 Leura S1 110 18 Bur3 0 0 0 0 0  
## Percent TT\_meas TT\_sow Pp\_sow TTAS  
## 1 0 936.574 13.05537 10.022 923.5186  
## 2 0 936.574 13.05537 10.022 923.5186  
## 3 0 936.574 13.05537 10.022 923.5186  
## 4 0 936.574 13.05537 10.022 923.5186  
## 5 0 936.574 13.05537 10.022 923.5186  
## 6 0 936.574 13.05537 10.022 923.5186

# graph  
df\_flower %>%  
 mutate(Variable =   
 factor(Variable,levels = c("Bud","Early","Open",  
 "Petal","Bur1","Bur2","Bur3","Bur4" ))) %>%  
 group\_by(TTAS,Cultivar,SowTreat,Variable,DAS) %>%  
 summarise\_each(funs(mean)) %>%  
 select(Variable,Percent, Cultivar,TTAS,SowTreat,SowingD,DAS) %>%  
 filter(Variable == "Bud") %>%  
 ggplot(aes(x=DAS, y=Percent)) +   
 geom\_line(aes(colour=Cultivar)) +  
 facet\_grid(SowTreat~Cultivar, scales = "free") +  
 geom\_abline(intercept = 50, slope = 0)+  
theme(axis.text.x = element\_text(angle = 60, hjust = 1))+  
 labs(x="Days after sowing",y="Percent of Plants with Floral bud ")

## geom\_path: Each group consists of only one observation. Do you need to  
## adjust the group aesthetic?  
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## adjust the group aesthetic?  
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## adjust the group aesthetic?

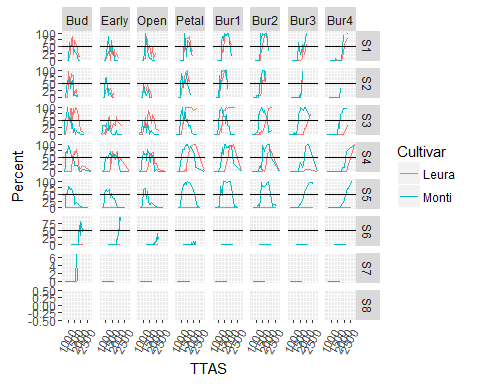


summary(df\_flower)

## SowingD Date Cultivar   
## Min. :2015-06-24 Min. :2015-10-12 Antas :2876   
## 1st Qu.:2015-07-28 1st Qu.:2015-12-10 Denmark :2883   
## Median :2015-11-05 Median :2016-01-21 Leura :2875   
## Mean :2015-10-20 Mean :2016-02-18 Monti :2877   
## 3rd Qu.:2015-12-15 3rd Qu.:2016-05-06 Narrikup :2883   
## Max. :2016-05-04 Max. :2016-08-30 Woogenellup:2878   
##   
## SowTreat DAS Plot Variable   
## S3 :3006 Min. : 49 Min. : 1.00 Bur2 :2188   
## S4 :2979 1st Qu.: 89 1st Qu.: 30.00 Bur1 :2175   
## S2 :2665 Median :119 Median : 57.00 Bud :2174   
## S5 :2592 Mean :121 Mean : 58.01 Early :2174   
## S1 :2556 3rd Qu.:155 3rd Qu.: 85.00 Petal :2174   
## S6 :2446 Max. :211 Max. :144.00 Open :2173   
## (Other):1028 (Other):4214   
## S1 S2 S3 S4   
## Min. :0.0000 Min. :0.0000 Min. :0.0000 Min. :0.0000   
## 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.0000   
## Median :0.0000 Median :0.0000 Median :0.0000 Median :0.0000   
## Mean :0.2063 Mean :0.2061 Mean :0.2034 Mean :0.2025   
## 3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.0000   
## Max. :1.0000 Max. :1.0000 Max. :1.0000 Max. :1.0000   
## NA's :424 NA's :424 NA's :424 NA's :424   
## S5 Percent TT\_meas TT\_sow   
## Min. :0.000 Min. : 0.00 Min. : 936.6 Min. : 13.05   
## 1st Qu.:0.000 1st Qu.: 0.00 1st Qu.:1722.5 1st Qu.: 275.03   
## Median :0.000 Median : 0.00 Median :2345.7 Median :1216.14   
## Mean :0.202 Mean : 20.41 Mean :2729.4 Mean :1240.97   
## 3rd Qu.:0.000 3rd Qu.: 40.00 3rd Qu.:4064.6 3rd Qu.:1798.60   
## Max. :1.000 Max. :100.00 Max. :5034.8 Max. :4038.56   
## NA's :424 NA's :424   
## Pp\_sow TTAS   
## Min. :10.02 Min. : 666.7   
## 1st Qu.:10.62 1st Qu.:1105.7   
## Median :13.48 Median :1447.5   
## Mean :13.37 Mean :1488.5   
## 3rd Qu.:15.36 3rd Qu.:1860.8   
## Max. :16.61 Max. :2848.4   
##

#by variable   
df\_flower %>%  
 mutate(Variable =   
 factor(Variable,levels = c("Bud","Early","Open",  
 "Petal","Bur1","Bur2","Bur3","Bur4" ))) %>%  
 group\_by(TTAS,Cultivar,SowTreat,Variable) %>%  
 summarise\_each(funs(mean)) %>%  
 select(Variable,Percent, Cultivar,TTAS,SowTreat) %>%  
 filter(Cultivar == "Monti" | Cultivar == "Leura" ) %>%  
 #filter(Variable == "Bud") %>%  
 ggplot(aes(x=TTAS, y=Percent)) +   
 geom\_line(aes(colour=Cultivar)) +  
 facet\_grid(SowTreat~Variable, scales = "free") +  
 geom\_abline(intercept = 50, slope = 0)+  
theme(axis.text.x = element\_text(angle = 60, hjust = 1))

## geom\_path: Each group consists of only one observation. Do you need to  
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## adjust the group aesthetic?  
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## adjust the group aesthetic?



# save final DF  
write.table(df\_flower, "df\_flower.txt")  
  
#Graph only Bud and Bur 4

Derrick's graph

#by variable   
df\_flower %>%  
 mutate(Variable =   
 factor(Variable,levels = c("Bud","Early","Open",  
 "Petal","Bur1","Bur2","Bur3","Bur4" ))) %>%  
   
 group\_by(TTAS,Cultivar,SowTreat,Variable) %>%  
 summarise\_each(funs(mean)) %>%  
 select(Variable,Percent, Cultivar,TTAS,SowTreat) %>%  
 filter(Cultivar == "Narrikup" | Cultivar == "Denmark" ) %>%  
 filter(Variable == "Bud") %>%  
 ggplot(aes(x=TTAS, y=Percent)) +   
 geom\_line(aes(colour=Cultivar)) +  
 facet\_grid(SowTreat~Variable, scales = "free") +  
 geom\_abline(intercept = 50, slope = 0)+  
theme(axis.text.x = element\_text(angle = 60, hjust = 1))

## geom\_path: Each group consists of only one observation. Do you need to  
## adjust the group aesthetic?

