Intro to R and First Steps in Crop Modeling

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1 Intro to R

A few first commands to get familiar with R

```
## Introduction to R

## R is a calculator
2 + 3

## You can create variables in R
x <- 7.3
y <- pi

print(y, digits = 15)

## R can be used as an object oriented language
## This means all objects have classes
## and methods can be written for each class

class(x)

x <- 1:20
y <- x * 3 + rnorm(20, sd = 2)

xyplot(y ~ x)

fit <- lm(y ~ x)
```

```
fit

class(fit)

names(fit)

summary(fit)
```

2 First steps in Crop Modeling: Leaf Number Appearance

```
## Example of leaf appearance calculation
library(lattice)

## Phyllochron for maize 25-55 degree days (ave. 40)

phyll <- 40

T.b <- 8 # Base temperature

cmi <- read.table("cmiWet-1990.txt", header=TRUE)

class(cmi)

dim(cmi)

## Temperature is in Fahrenheit
TempC <- (cmi$Temp - 32) * 5/9

## Coding exercise to calculate GDD
res.col <- numeric(length(TempC))

for(i in 1:length(TempC)){
```

```
  tmp <- TempC[i] - T.b

  if(tmp < 0){
    res.col[i] <- 0
  }else{
    res.col[i] <- tmp
  }
}

plot(res.col)

TTcum <- cumsum(res.col)

doy <- seq(from = 1, to = 365, by = 1)

xyplot(TTcum ~ doy,
       type = "l",
       ylab = "Cummulative Thermal Time",
       xlab = "Day of the Year")

## How do we calculate the number of leaves?

## First select a range of values plausible for leaf production

## Day of crop emergence and tasseling

day1 <- 110 ## Apr 20
dayn <- 195 ## July 14

TTcum.sub <- TTcum[day1:dayn] - 258
LeafProd <- TTcum.sub %/% 40

xyplot(LeafProd ~ day1:dayn, type = "l")

# Maize produces 16-23 leaves (Hay & Porter, 2006)
# Could be up to 30 under the right conditions
```