

2020-21 OrchardWatch sensor analysis

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```
## Warning: package 'reshape2' was built under R version 4.1.3

## Warning: package 'dplyr' was built under R version 4.1.3

##
## 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

## Warning: package 'tidyverse' was built under R version 4.1.3

##
## Attaching package: 'tidyverse'

## The following object is masked from 'package:reshape2':
## 
##     smiths

## Using datetime as id variables

## [1] "rh"      "n-main"   "rh"      "n-main"   "rh"      "n-main"   "n-main"
## [9] "rh"      "n-main"

## Warning in matrix(unlist(test_out), ncol = 3, byrow = T): data length [10] is
## not a sub-multiple or multiple of the number of rows [4]

##      [,1]      [,2]      [,3]
## [1,] "rh"      "n-main"   "rh"
## [2,] "n-main"   "rh"      "n-main"
## [3,] "rh"      "n-main"   "rh"
## [4,] "n-main"   "rh"      "n-main"
```

Numeric exploration

values orchard-wide during first inoculum period

Temperature

```
## [1] "2020"

##   Min. 1st Qu. Median   Mean 3rd Qu.   Max. NA's
## 28.29 42.98 51.57 52.03 60.06 83.73 10784

## [1] "2021"

##   Min. 1st Qu. Median   Mean 3rd Qu.   Max. NA's
## 21.03 44.81 51.57 52.59 59.72 89.49 12208
```

Relative humidity

```
## [1] "2020"

##   Min. 1st Qu. Median   Mean 3rd Qu.   Max. NA's
## 14.07 42.83 61.40 63.03 84.90 100.00 5557

## [1] "2021"

##   Min. 1st Qu. Median   Mean 3rd Qu.   Max. NA's
## 17.18 49.55 66.94 66.62 84.91 100.00 12208
```

Leaf wetness

```
## [1] "2020"

##   Min. 1st Qu. Median   Mean 3rd Qu.   Max. NA's
## 0.00  0.60  1.80 13.68  7.60 100.00 6981

## [1] "2021"

##   Min. 1st Qu. Median   Mean 3rd Qu.   Max. NA's
## 0.00  2.40  4.10 19.91  6.50 100.00 2555

## 
## Call:
## lm(formula = nmain_rh$value ~ nmain_temp$value + nmain_wet$value)
## 
## Residuals:
##       Min     1Q   Median     3Q    Max 
## -51.107 -12.786 -1.223  13.703  40.640 
## 
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)    
## (Intercept)  13.680    1.800   7.600  0.0000 *** 
## nmain_temp  -12.786    2.400  -5.283  0.0000 *** 
## nmain_wet   -1.223    0.600  -2.038  0.0500 .  
## ---
```

```

## (Intercept)      74.169342   0.502371  147.64   <2e-16 ***
## nmain_temp$value -0.308098   0.009159  -33.64   <2e-16 ***
## nmain_wet$value    0.429884   0.003341  128.68   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 17.36 on 28626 degrees of freedom
##   (1144 observations deleted due to missingness)
## Multiple R-squared:  0.4042, Adjusted R-squared:  0.4041
## F-statistic:  9708 on 2 and 28626 DF,  p-value: < 2.2e-16

## Analysis of Variance Table
##
## Response: nmain_temp$value
##           Df  Sum Sq Mean Sq F value    Pr(>F)
## nmain_rh$value     1 180206 180206    1462 < 2.2e-16 ***
## Residuals       29327 3614920      123
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## Warning in AIC.default(lm(nmain_rh$value ~ nmain_temp$value +
## nmain_wet$value), : models are not all fitted to the same number of observations

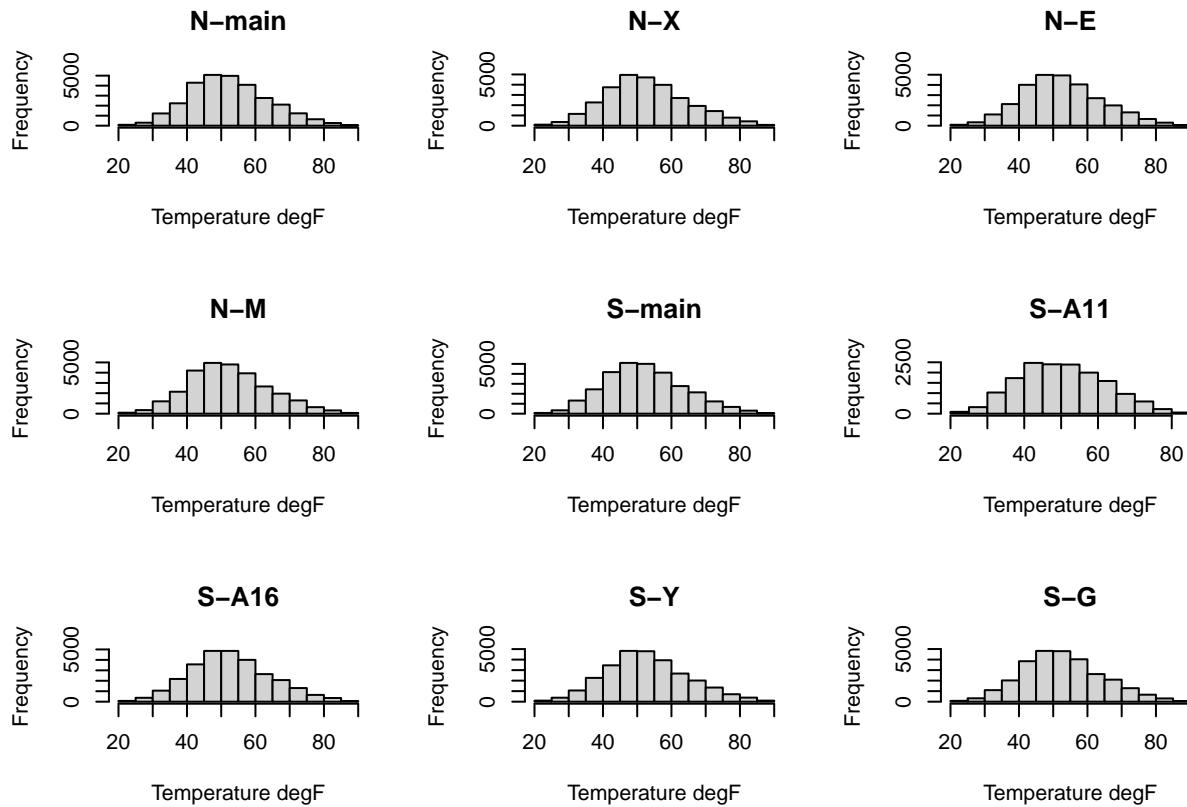
##                                     df      AIC
## lm(nmain_rh$value ~ nmain_temp$value + nmain_wet$value) 4 244669.3
## lm(nmain_temp$value ~ nmain_rh$value)                      3 224435.2

##
## Call:
## lm(formula = smain_temp$value ~ smain_rh$value)
##
## Residuals:
##      Min      1Q      Median      3Q      Max 
## -29.308  -7.817  -0.364   7.211  34.105 
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)    
## (Intercept) 58.152255  0.207476 280.28   <2e-16 ***
## smain_rh$value -0.091043  0.003025 -30.09   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 11.37 on 29771 degrees of freedom
## Multiple R-squared:  0.02953,  Adjusted R-squared:  0.02949
## F-statistic: 905.7 on 1 and 29771 DF,  p-value: < 2.2e-16

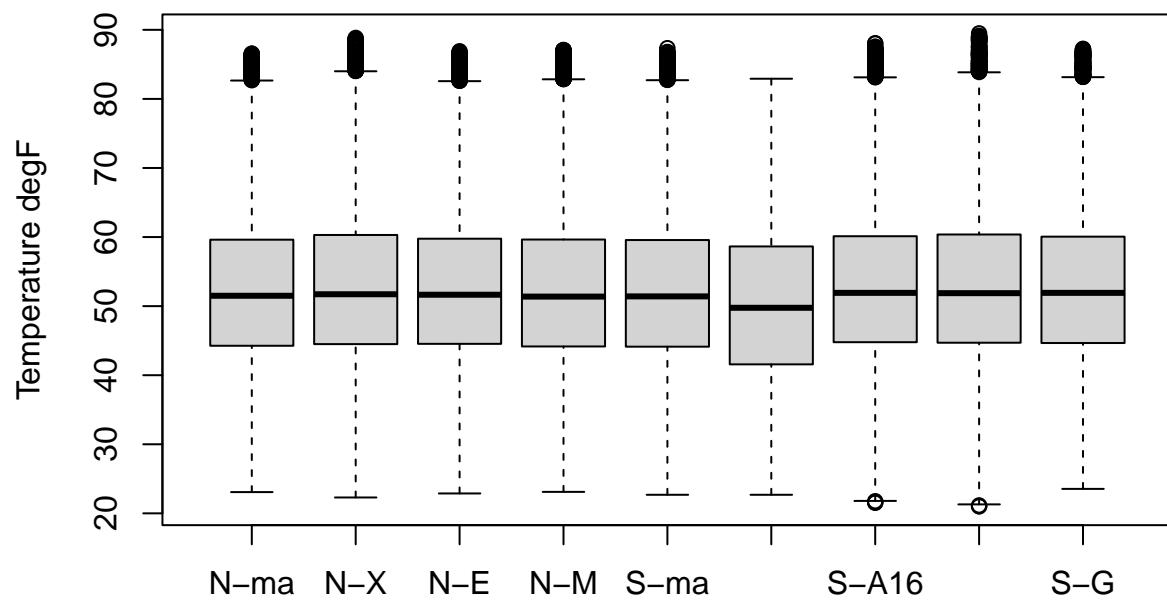
```

Graphical exploration

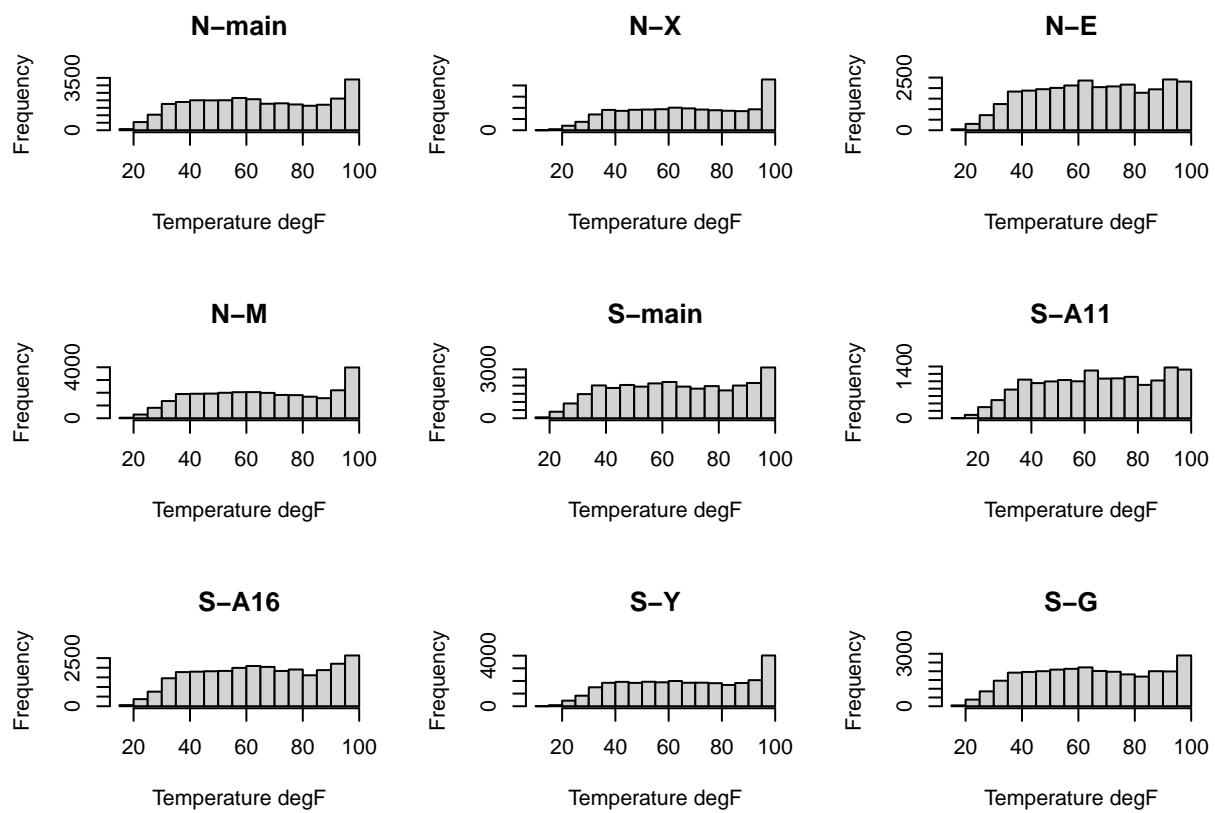
Temperature values by site



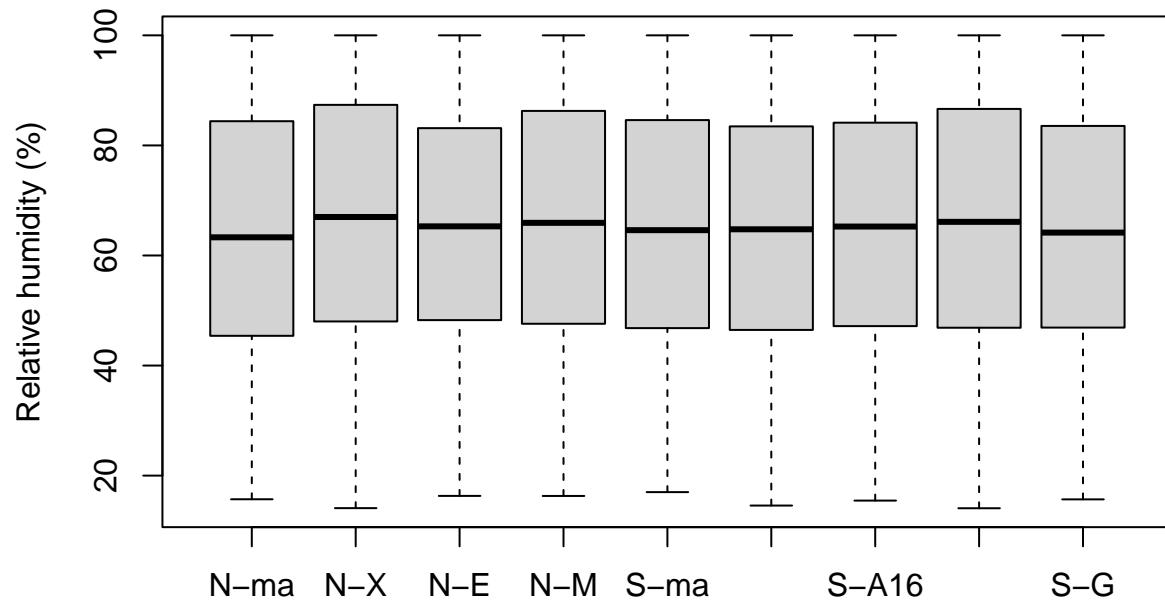
2020–2021 Temperature ranges



Relative humidity values by site



2020–2021 RH ranges



North sites RH ~ leaf wetness

