Model Metrics

Region data

Linear Ridge regression

```
Elapsed time to fit model: 1.04 seconds
Mean train CV score: -0.066

Train MAE:  0.049
Test MAE:  0.052
Train R-squared:  0.036
Test R-squared:  0.040
Train RMSE:  0.100
Test RMSE:  0.081
```

Random Forest regression

```
Elapsed time to fit model: 123.23 seconds
Mean train CV score: -0.066

Train MAE:  0.052
Test MAE:  0.053
Train R-squared:  0.028
Test R-squared:  0.028
Train RMSE:  0.100
Test RMSE:  0.082
```

Support Vector regression

```
Elapsed time to fit model: 1.52 seconds
Mean train CV score: -0.070

Train MAE:  0.057
Test MAE:  0.057
Train R-squared:  0.023
Test R-squared:  0.012
Train RMSE:  0.101
Test RMSE:  0.083
```

Subregion data

Linear Ridge regression

```
Elapsed time to fit model: 1.07 seconds
```

```
Mean train CV score: -0.066

Train MAE:  0.052
Test MAE:  0.052
Train R-squared:  0.057
Test R-squared:  0.082
Train RMSE:  0.099
Test RMSE:  0.080
```

Random Forest regression

```
Elapsed time to fit model: 123.56 seconds
Mean train CV score: -0.066

Train MAE:  0.052
Test MAE:  0.055
Train R-squared:  0.047
Test R-squared:  0.074
Train RMSE:  0.099
Test RMSE:  0.080
```

Support Vector regression

```
Elapsed time to fit model: 1.91 seconds
Mean train CV score: -0.070

Train MAE:  0.057
Test MAE:  0.058
Train R-squared:  0.034
Test R-squared:  0.039
Train RMSE:  0.100
Test RMSE:  0.081
```

Hive stressor “pest” data

Linear Ridge regression

```
Elapsed time to fit model: 1.14 seconds
Mean train CV score: -0.062

Train MAE:  0.045
Test MAE:  0.046
Train R-squared:  0.125
Test R-squared:  0.095
Train RMSE:  0.095
Test RMSE:  0.079
```

Random Forest regression

```
Elapsed time to fit model: 123.34 seconds
Mean train CV score: -0.063

Train MAE:  0.045
Test MAE:  0.047
Train R-squared:  0.150
Test R-squared:  0.132
Train RMSE:  0.094
Test RMSE:  0.077
```

Support Vector regression

```
Elapsed time to fit model: 18.49 seconds
Mean train CV score: -0.068

Train MAE:  0.059
Test MAE:  0.058
Train R-squared:  0.087
Test R-squared:  0.056
Train RMSE:  0.097
Test RMSE:  0.081
```

Varroa mites and region data

Linear Ridge regression

```
Elapsed time to fit model: 1.12 seconds

Mean train CV score: -0.065
Train MAE:  0.048
Test MAE:  0.050
Train R-squared:  0.054
Test R-squared:  0.042
Train RMSE:  0.099
Test RMSE:  0.081
```

Random Forest regression

```
Elapsed time to fit model: 122.60 seconds

Mean train CV score: -0.066
Train MAE:  0.050
Test MAE:  0.051
```

```
Train R-squared:  0.065
Test R-squared:  0.013
Train RMSE:  0.098
Test RMSE:  0.083
```

Support Vector regression

```
Elapsed time to fit model: 7.89 seconds
Mean train CV score: -0.139

Train MAE:  0.056
Test MAE:  0.059
Train R-squared:  0.033
Test R-squared:  0.008
Train RMSE:  0.100
Test RMSE:  0.083
```

Matrix of varroa mites, pesticides, and region data

Linear Ridge regression

```
Elapsed time to fit model: 0.73 seconds
Mean train CV score: -0.065

Train MAE:  0.049
Test MAE:  0.049
Train R-squared:  0.058
Test R-squared:  0.042
Train RMSE:  0.099
Test RMSE:  0.081
```

Random Forest regression

```
Elapsed time to fit model: 121.03 seconds
Mean train CV score: -0.066

Train MAE:  0.050
Test MAE:  0.051
Train R-squared:  0.066
Test R-squared:  0.038
Train RMSE:  0.098
Test RMSE:  0.081
```

Support Vector regression

```
Elapsed time to fit model: 23.64 seconds
Mean train CV score: -0.070

Train MAE:  0.058
Test MAE:  0.057
Train R-squared: -0.003
Test R-squared: -0.007
Train RMSE:  0.102
Test RMSE:  0.083
```