# \*Variety Data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variety** | **Number**  **Plants** | **Number**  **Flowered** | **Percent**  **Flowered** | **In**  **Experiment?** | **Mean Budburst Date** |
| Alicante Bouschet | 7 | 0 | 0 | N | 13.90577701 |
| Aligote | 6 | 0 | 0 | N | 13.32480202 |
| Auxerrois | 5 | 1 | 20 | N | 13.9534995 |
| Barbera | 9 | 1 | 11.11111111 | N | 12.42439584 |
| Cabernet franc | 7 | 0 | 0 | N | 13.84282667 |
| Cabernet Sauvignon | 9 | 1 | 11.11111111 | Y | 14.70570969 |
| Calzin | 5 | 3 | 60 | N | 14.66366038 |
| Carmenere | 8 | 0 | 0 | Y | 15.55223647 |
| Carnelian | 9 | 3 | 33.33333333 | N | 11.59739021 |
| Chardonnay | 7 | 0 | 0 | Y | 13.27202255 |
| Chasselas doree | 7 | 0 | 0 | Y | 11.70141943 |
| Cinsault | 7 | 0 | 0 | Y | 16.36545183 |
| Coda di Volpe | 5 | 0 | 0 | N | 15.02306213 |
| Counoise | 9 | 0 | 0 | N | 17.88661987 |
| Dolcetto | 7 | 1 | 14.28571429 | Y | 14.67593836 |
| Durif | 15 | 6 | 40 | Y | 13.47568268 |
| Early Muscat | 6 | 0 | 0 | N | 11.74416829 |
| Furmint | 8 | 0 | 0 | Y | 14.97641002 |
| Gamay Noir | 8 | 4 | 50 | N | 12.87555823 |
| Gewurztraminer | 9 | 1 | 11.11111111 | Y | 12.45307628 |
| Gruner Veltiner | 7 | 0 | 0 | N | 14.86512484 |
| July Muscat | 5 | 0 | 0 | N | 11.20999857 |
| Macabeo | 6 | 0 | 0 | Y | 15.65572537 |
| Marsanne | 9 | 2 | 22.22222222 | N | 14.2368048 |
| Melon | 5 | 0 | 0 | N | 14.32830313 |
| Merlot | 6 | 0 | 0 | Y | 13.94825499 |
| Morrastel | 6 | 0 | 0 | N | 15.71067531 |
| Nebbiolo | 6 | 0 | 0 | Y | 13.6417069 |
| Palomino | 4 | 0 | 0 | Y | 14.87955351 |
| Pinot gris | 8 | 1 | 12.5 | N | 13.89299853 |
| Pinot Meunier | 6 | 3 | 50 | N | 13.73747328 |
| Pinotage | 5 | 3 | 60 | N | 10.7102415 |
| Refosco | 6 | 0 | 0 | N | 14.52280194 |
| Rkatsiteli | 5 | 0 | 0 | Y | 16.30820068 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variety** | **Number**  **Plants** | **Number**  **Flowered** | **Percent**  **Flowered** | **In**  **Experiment?** | **Mean Budburst Date** |
| Rotgipfler | 7 | 1 | 14.28571429 | N | 14.4536252 |
| Roussanne | 6 | 0 | 0 | N | 16.77879992 |
| Ruby Cabernet | 8 | 4 | 50 | N | 15.75792645 |
| Ruby Seedless | 6 | 0 | 0 | N | 16.00731428 |
| Sangiovese | 7 | 0 | 0 | Y | 13.06463094 |
| Sauvignon blanc | 7 | 3 | 42.85714286 | Y | 15.75054996 |
| Schiopettino | 8 | 0 | 0 | N | 14.68581677 |
| Syrah | 8 | 1 | 12.5 | Y | 13.78461575 |
| Szagos feher | 7 | 1 | 14.28571429 | N | 13.51749972 |
| Tempranillo | 12 | 5 | 41.66666667 | Y | 14.63416892 |
| Tocai Friulano | 5 | 1 | 20 | N | 16.64069008 |
| Ugni blanc/Trebbiano | 5 | 0 | 0 | Y | 18.40547719 |
| Verdelho | 6 | 5 | 83.33333333 | N | 11.08427436 |
| Viognier | 8 | 0 | 0 | Y | 14.42165669 |
| Zinfandel/Primitivo | 6 | 0 | 0 | Y | 15.01516845 |

Table 1

Data on the 50 varieties grown in the lab (greenhouse), including % flowering mean budburst data (days after 15 August, when the plants were moved out of dormancy). We selected a subset of varieties for the experiment after budburst, which is indicated in the ‘In experiment’ column.

# \*Wang and Engel Curve



Figure 1

These theoretical curves show the expected response of phenological rate to temperature. In this example, the blue line represents a variety adapted better to cooler temperatures, while the variety represented by the red line has a higher optimal temperature.

# RMI and Greenhouse Budburst



ghrmi\_vars\_noarrows

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RMI/GH | F | DF | Estimate | Std Error | P |
| budburst | 14.55 | 1,47 | 0.8678 | 0.2275 | 0.0003977 |

# RMI and Greenhouse Leafout



ghrmi\_vars\_noarrows

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RMI/GH | F | DF | Estimate | Std Error | P |
| leafout | 18.91 | 1,47 | 0.9588 | 0.2205 | 0.00007307 |

# \*RMI and Greenhouse Budburst

# 

Figure 2 (includes budburst and leafout comparisons)

The day of budburst and leafout in the Robert Mondavi Institute Vineyard 2015 growing season compared to the day of budburst and leafout in the greenhouse during the experiment. Each data point represents a different variety that was grown both in the vineyard and in the greenhouse.

# Soil Moisture

chamber\_smfin

|  |  |  |
| --- | --- | --- |
| Mean soil moisture | continuous | |
|  | **F** | 8.0541 |
|  | **P** | 0.009089 |
|  | **DF** | 1,24 |

# \*Days until 10% Flowering

chamber\_10percfin

|  |  |  |
| --- | --- | --- |
| Days to 10% flowering | continuous | |
|  | **F** | 0.4324 |
|  | **P** | 0.5183 |
|  | **DF** | 1,20 |

Figure 3

The black points and bars show the average number of days it took for plants to reach 10% flowering (once out of dormancy) and error in each chamber. The number above each chamber’s data is the sample size. The colored points represent individual plants. The legend in the top left corner gives the night/day temperature for each chamber.

# Days Until 50% Flowering

chamber\_50percfin

|  |  |  |
| --- | --- | --- |
| Days to 50% flowering | continuous | |
|  | **F** | 0.4987 |
|  | **P** | 0.4909 |
|  | **DF** | 1,15 |

# Change in Stem Length

chamber\_stemlenfin

|  |  |  |
| --- | --- | --- |
| Max change in stem length | continuous | |
|  | **F** | 0.5347 |
|  | **P** | 0.4717 |
|  | **DF** | 1,24 |

The black points and bars show the mean stem growth and error in each chamber, and the number above each chamber’s data is the sample size. The colored points show each individual plant’s change in stem length during its time in the growth chambers. The legend in the top left corner gives the night/day temperature for each chamber.

# Changing in Leaf Number

chamber\_leafnumfin

|  |  |  |
| --- | --- | --- |
| Max change in leaf number | continuous | |
|  | **F** | 0.0455 |
|  | **P** | 0.8329 |
|  | **DF** | 1,24 |

The black points and bars show the mean change in leaf number and error in each chamber, and the number above each chamber’s data is the sample size. The colored points show each individual plant’s change in leaf number during its time in the growth chambers. The legend in the top left corner gives the night/day temperature for each chamber.

# \*Number of Flower Buds Aborted

chamber\_bagbudsfin

|  |  |  |
| --- | --- | --- |
| Sum of fallen buds | continuous | |
|  | **F** | 7.4285 |
|  | **P** | 0.01179 |
|  | **DF** | 1,24 |

Figure 4

The black points and bars show the mean and error for the number of flower buds aborted in each chamber, and the number above each chamber’s data is the sample size. The colored points show the number of buds each individual plant lost during its time in the growth chambers. The legend in the top left corner gives the night/day temperature for each chamber.

# Spur Diameter Predicting 50% Flowering



gh\_loghistfin

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Prob of flowering (50%)  based on spur size | Estimate | Std Error | Z value | PR () | DF |
|  | 0.4273 | 0.1502 | 2.208 | 0.0273 | 340 |
|  |  |  |  |  |  |

# Change in Leaf Number v Change in Stem Length (2 plots)

