FINAL REPORT

Project Title: Development index model of sweet cherry

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Cooperators: Alan Reitz Mount, Adams Fruit; Garrett Bishop, GS Long; Mark Lapierre, Wilbur Ellis; Eric Shrum, Mike Omeg, Orchard View Farms

Total Project Request: **Year 1:** $131,909 **Year 2: $136,083**

Other funding sources: Year 1: Columbia Gorge Fruit Growers, $23,562; Washington Blueberry Commission, $5,250 **Year 2:** Columbia Gorge Fruit Growers, $23,562; Washington Blueberry Commission, $5,250

Budget 1
Organization Name: OSU-ARF **Contract Administrator:** Russ Karow
Telephone: 541-737-3228 **Email address:** Russell.Karow@oregonstate.edu

Item	2019	2020
Salaries[1]	$39,026	$40,197
Benefits	$23,696	$24,407
Wages[2]	$17,213	$17,729
Benefits	$13,657	$14,067
Equipment	-	-
Supplies[3]	$1,000	$1,000
Travel[4]	$2,000	$2,000
Plot Fees	-	-
Miscellaneous	-	-
Total	$96,592	$99,401

Footnotes:
[1]Postdoctoral Research Associate: 0.7 FTE with 3% increase factored into Year 2.
[2]Biological Science Tech: 0.5 FTE with 3% increase factored into Year 2.
[3]Miscellaneous supplies for sample collection and preparation.
[4]Travel to grower field for sample collection.

Budget 2

Organization Name: WSU **Contract Administrator:** Karen Kniep
Telephone: **Email address: kmkniep@wsu.edu**

Item	2019	2020
Salaries	25,357	26371
Benefits	8,757	9,108
Wages		
Benefits		
Equipment		
Supplies		
Travel	1,203	1,204
Miscellaneous		
Plot Fees		
Total	35,317	36,683

Footnotes:
[1]**Systems Analyst:** 4.7 months at 1.0 FTE

PLEASE NOTE:

This report was originally funded for two years [June 2019- June 2021]. The reduction in time and funding by 12 months has severely curtailed result reporting. The following report is therefore a preliminary discussion of partial results.

JUSTIFICATION

Modelling is an extremely useful tool to assist scientists, growers and distributors with planning and execution of strategic objectives. This modelling is aimed at achieving the following:

- Predicting critical temperatures of **freeze tolerance** for flowers of sweet cherry (beginning in September and ending at bloom).
- Producing an optimized developmental model of sweet cherry (beginning in September and ending at fruit maturation) that is location and cultivar dependent. This will predict **dormancy acquisition**, **mid-winter hardiness**, **bloom** and, most importantly, **harvest time**. This uses a growing/degree/hour model employing air temperature data to assist growers in determining when and where to utilize specific management practices to prevent or minimize freeze damage and optimize cherry size / quality at harvest.
- Presenting these models on AgWeatherNet [AWN] for all to access.
  - The freeze tolerance model will be available on AgWeatherNet in Spring 2019.
  - The combined vernalization/freeze tolerance/bloom (VFB) model to be available end of 2020.
  - Data collection and analysis will continue through 2019 and 2020 to allow for the creation of a maturation model. Data for numerous cultivars will be included to strengthen this model.

Results and Discussion

Cold-hardiness data was obtained by differential thermal analysis, bud and bloom phenology data by relative water content and bloom count. Collection of materials for this grant was accomplished by OSU-MCAREC (2017-2020). My thanks to Allan Bros Fruit who also collected material and provided relative water content data in the Tri-Cities (2018), G.S. Long in Yakima (2019) for cold-hardiness data and Mount Adams Fruit in the Columbia Gorge (2019) for providing material for relative water content analysis and bloom counts.

Pre-processing of cold hardiness and bud phenology data was performed by me to show a clearer picture of the trends in development. These data, encompassing 2013 to 2020, were shared with AWN beginning in 2017. Seminars were presented at AWN during the course of this funding explaining in full detail methods employed to gather and process the data. No cold-hardiness nor phenological data were collected by AWN during this time. All unprocessed data was also shared with AWN in spring 2020 and full instruction given as to the required preprocessing analysis.

Fruit maturation data from 2013 to 2019 was obtained by photography and gravimetry. These data were preprocessed and shared with AWN. During year 2 of this proposal these maturation data were to be included in the modelling.

Temperature modelling as explained by variable rate curves (as opposed to linear models) was encoded by AWN from my Excel spreadsheets. Unfortunately, the Python coding was not shared with me for evaluation, nor were the results of the Python programming for error checking.

A reset of 2020 spring model data due to unusual conditions was necessary but was not completed by AWN to reflect the current assessment of development at OSU-MCAREC.

Early indications showed that this modelling approach would provide a very useful tool for growers and marketers.