

VENTED ORCHARD COVERS STUDY

Protection against Rain and Hail



Acknowledgments

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Climate Action Initiative
BC AGRICULTURE & FOOD



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Background

- Rain resulting in rot and splits, and hail damage can devastate a crop causing serious losses of yield
- Currently commercial cherry growers in the Okanagan Valley use a combination of wind machines, helicopters, tractor blowers, and rain protectant chemical products to defend against rain resulting in great expense, and pollution to the environment
- There is currently no defense against hail
- Covers are becoming a popular defense in Europe, Chile, and Australia where rainfalls are frequent

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Scope

- We set out to evaluate the positives and negatives of implementing covers to a commercial cherry operation in the Okanagan Valley, BC (Coral Beach Farms) over a period of 4 seasons
- The study was conducted on 11 acres of covered Sweet Cherries - mainly Rainier Cherries (Blush), Stardust Cherries (Blush), and some Sweetheart Cherries (Red)
- We compared this with the same varieties and acres outside of the covers directly adjacent



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Study Methods and Measures

- Comparisons were made with regards to:
 - Climate
 - Rain damage during rain event
 - Fruit firmness
 - Sugars (Brix)
 - Size of cherries
 - Yield of crop/acre
- Other considerations:
 - Cost effectiveness & value
 - Use of irrigation water



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Challenges and setbacks

- Reliance on changing summer students each season
- Resulting collected data was inconsistent in quality and measure
- Unexpected early harvest of 2015 resulted in little covers being up in time for rain event and subsequent abandonment of Crop under analysis. It also had some bud damage from winter
- 2014, and 2017 we had little to no rain events to study covers effectiveness

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Assumptions

OBVIOUS BENEFIT:

- Practically eliminate risk of hail and rain damage

POTENTIAL RISKS:

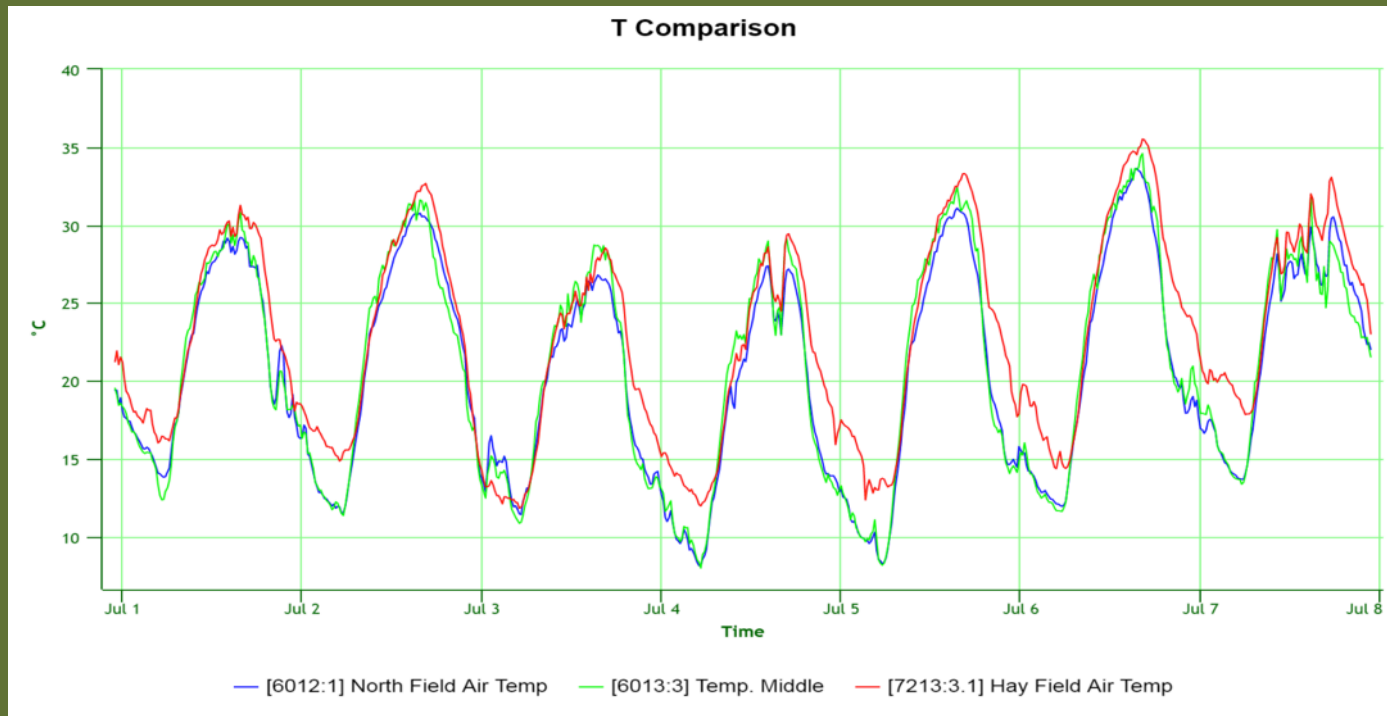
- Greenhouse effect – Overheating
- Reduce firmness
- Reduce shelf life
- Reduce quality and taste
- Not cost efficient
- Powdery Mildew issues



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Climate Comparisons

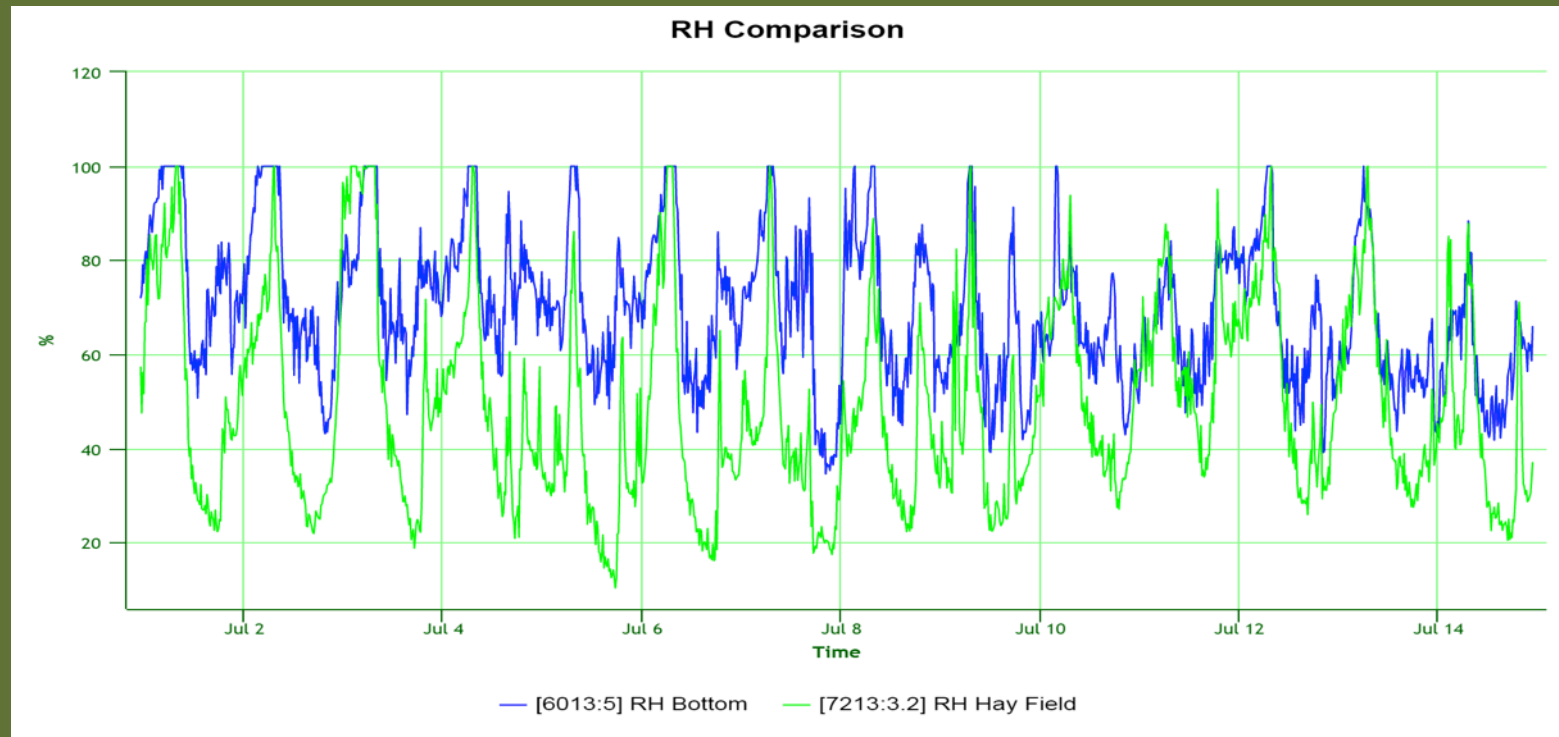
- Temperature
 - Ranged between 0.3°C and 3°C warmer under the covers



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Climate Comparisons

- Humidity
 - Typically ranged between 20-30% greater humidity under the covers



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Quality Analysis

- Sugars (Brix)
 - Uncovered fruit had on average slightly higher sugars 20.9% vs 19.8%
- Colour
 - Blush colour is moderately affected from reduced sunlight
- Firmness (Pa)
 - Covered cherries measured slightly less under pressure test than that of uncovered
314 Pa vs 292 Pa
- Taste
 - Both uncovered and covered had the same high quality taste

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Pack out Analysis

- Yield
 - There was no noticeable increase in yields between covered and uncovered with both averaging 5 ton/acre and 76% grade #1
- Size of cherries
 - Uncovered cherries were on average smaller with 80% being 9.5 row or larger vs 90% with that of covered cherries
 - The exception to this was if there was a significant rain event then these results would be reversed

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Other Analysis

- Maturity Dates
 - Cherries under the cover tend to be 5-7 days ahead in maturity compared to uncovered
- Irrigation efficiency
 - As a result of increased humidity under the covers we were able to irrigate 30% less and maintain equal soil moisture compared to similar proximate fields

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Cost Analysis

- Capital Cost
 - \$25,500/acre
 - or annual cost of \$5100/acre spread over 5 years (Expected life of covers dependent on use and conditions)
- Annual Costs
 - \$3000/acre (install and winterize costs)
 - Plus \$3000/acre (summer pruning and rollout of Extenday tarps)
- Recommended minimum FOB Price Premium required to break even on investment with 5 ton yield and 76% packout
 - \$1.33/lb

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Summary of Analysis

- Reduced Bird Damage
- Improved size of cherries
- Reduced irrigation needs due to increased humidity
- It is hotter under the covers
- Potential to reduce or replace rain protection costs e.g. helicopter and tractor drying, chemical rain retardants such as Parka
- More environmentally friendly with reduced carbon footprint and less chemical use
- Covers do not 100% guarantee rain and hail protection. They do significantly reduce damage but side winds have allowed penetration in areas during our experience

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Summary of Analysis

- Bee Activity was increased beneath the covers
- Harvest was one week earlier (not particularly a benefit in our case)
- Stems appeared greener under the covers
- It is cost efficient when used with high value crops such as cherries which can range \$3 to \$7/LB variety and market dependent
- The use of covers needs to be trusted in order to not add further costs to production
- No signs of any Powdery Mildew issues

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Recommended Additional Practices

- Ventilation Management is useful to reduce temperatures under covers for pickers and for the cherries. Coral Beach uses wind machines.
- Extended reflective tarps and leaf pruning help to improve blush colour of cherries under covers

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Next Steps

- The findings in this study are preliminary and future work is required before industry recommendation
- Coral Beach will continue to experiment and try to evaluate the covers more
- Coral Beach's confidence has grown in the covers and they are currently investing in a further 12.5 acres of Voen covers in the Coldstream area. Another high altitude, northern area where high value crops are prone to splits from rain