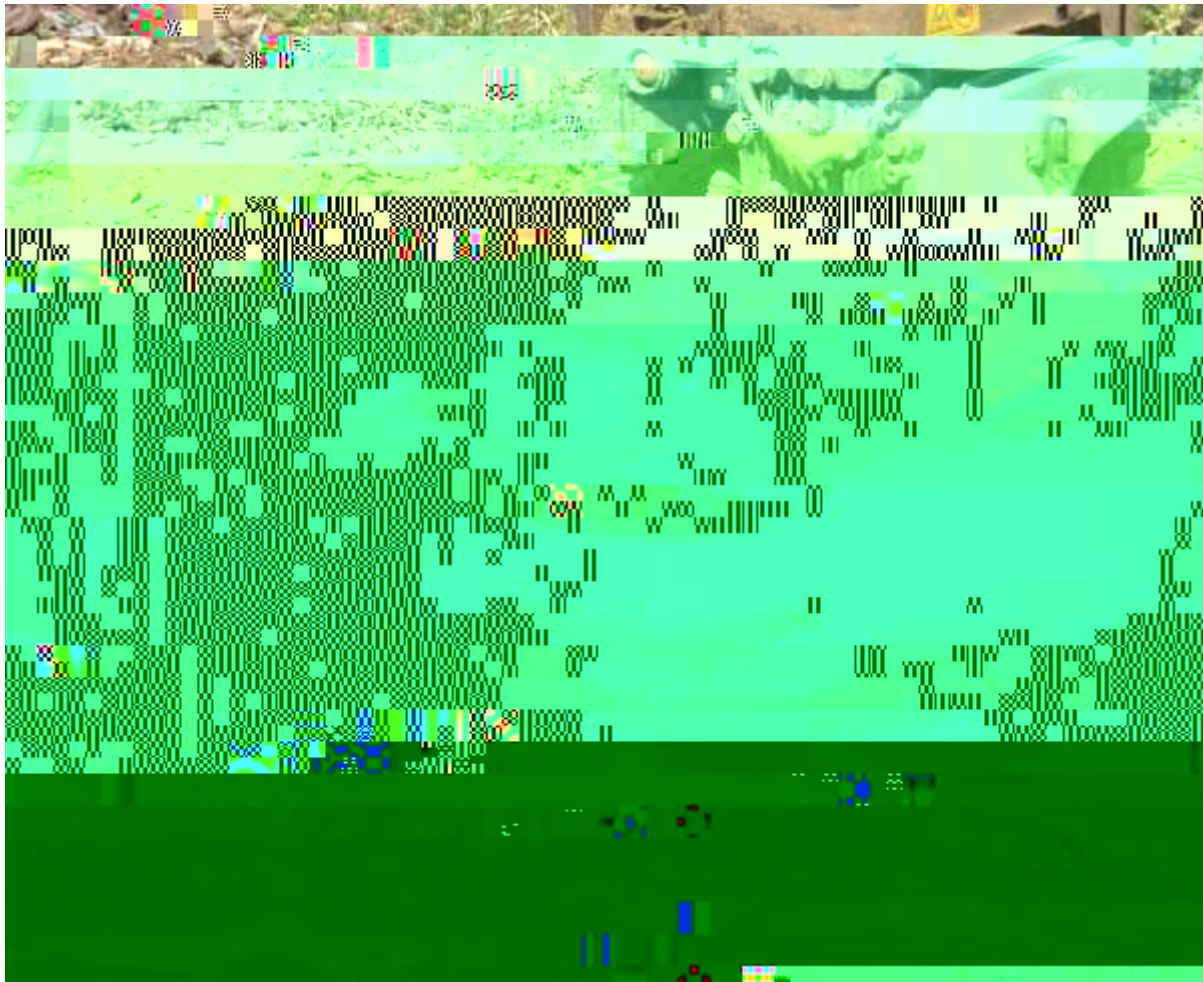


2014 Hops Crowning Trial



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As the acreage of hops continues to rapidly expand in the northeast, there is a great need for production knowledge specific to our region. Downy mildew has been identified as the primary pathogen plaguing our hop yards. This disease causes reduced yield, poor hop quality, and can cause the plant to die. Control measures that reduce disease infection and spread while minimizing the impact on the environment are desperately needed for the region. Mechanical control is one means to reduce downy mildew pressure in hop yards. Scratching is a practice initiated in the early spring when new growth has just emerged from the soil. The first shoots have an irregular growth rate and are not the most desirable for producing hop cones later in the season. Removal of this new growth through mechanical means helps to remove downy mildew inoculum that has overwintered in the crown. The top of the crown itself can be removed to further eliminate overwintering downy mildew. This practice is typically referred to as “Crowning”. While crowning is known to be effective in the Pacific Northwest, there is no established time frame for crowning in the Northeast. The goal of this project was to evaluate the impact of crowning/scratching at two different time periods on hop downy mildew pressure as well as hop yield and quality.

MATERIALS AND METHODS

The replicated research plots were located at Borderview Research Farm in Alburgh, VT on a Benson rocky silt loam. The experimental design was a randomized complete block with 10' x 35' plots (each plot had 7 hills). Plots were replicated 3 times. Main plots consisted of two varieties. Cascade served as a moderately resistant cultivar and Nugget served as a downy mildew susceptible



hydroxide and works as a control measure against downy mildew in hops. When copper hydroxide is mixed with water, it releases copper ions, which disrupt the cellular proteins of the fungus. Regalia is a broad spectrum bio-fungicide that works by stimulating the plant's natural defenses. The active ingredient is extracted from giant knotweed (*Fallopia sachalinensis*). All pesticides applied were OMRI-approved for use in organic systems and were applied at rates specified by their labels using a Rear's Manufacturing Nifty Series 50-gallon stainless steel tank utility sprayer with PTO driven mechanical agitation, a 3-point hitch, and a Green Garde® JD9-CT spray gun.

Table 1. 2014 Spray schedule in the organic hop crowning trial, Alburgh, VT.

Date	Downy Mildew control Champ WG	Broad spectrum disease control Regalia
21-May [REDACTED]	X	X

RESULTS

Using data from a Davis Instruments Vantage Pro2 weather station at Borderview Research Farm in Alburgh, VT, weather data was summarized for the months spanning from the 2013 harvest to the 2014 harvest.

The 2014 growing season (March-September) experienced 5325 GGD's, which were 25 less than the 30 year average (1981-2010 data). Precipitation was above average during the growing season (Table 2).

Table 2. Temperature, precipitation, and Growing Degree Day summary, Alburgh, VT, 2014.

Hop Cultivar x Crowing Date Interactions

Figure 1: Effect of crowing date on the number of downy mildew infected aerial spikes, Alburgh, VT, Mid-July 2014. Treatments with the same letter are not significantly different from each other.

The date at which hops were crowned had little impact on downy mildew, hop yield, and hop quality (Table 3).

Table 3. Yield and quality performance of hops crowned on 3 dates, Alburgh, VT, 2014.

Crowning Date	Alpha acids %	Beta acids %	HSI	Yield @ 8% moisture lbs ac ⁻¹	100 cone weight g	Cones with downy mildew %	Browning severity
14-Apr	12.0	7.85	0.24	868	17.1*	33.7	3.83
12-May	11.8	6.94	0.24	788	14.8	37.8	4.17
Control	10.9	6.78	0.23	790	17.1*	34.7	3.67
LSD	NS	NS	NS	NS	1.1	NS	NS
Trial mean	11.7	7.24	0.24	816	16.3	35.4	3.89

Treatments indicated in **bold** had the top observed performance.

LSD – Least significant difference.

NS = No significant difference.

* Treatments indicated with an asterisk did not perform significant TJ919 66.96 12.6 reW*acant

Figure 2: Effect of crowning date on hop 100 cone weight, Alburgh, VT, 2014. Treatments with the same letter are not significantly different from each other.

Effect of Cultivar

terms of yield, creates only a slight decline in downy mildew infested cones. It is worth noting that the crowning done in this trial was on the gentle side compared to some practices. A more aggressive crowning may yield different results. Other crowning methods scratch the entire length of the plant bed instead of targeting individual plants. It would be interesting to see how the results differ with that strategy.

ACKNOWLEDGEMENTS

The UVM Extension Crops and Soils Team would like to thank Borderview Research Farm and staff for their generous help with the trials. We would like to thank Conner Burke, Julija

