

Alaska Phenology Study

May 1

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Abstract:

In this Alaska Phenology study an answer to the questions “Can moisture content of Alaska Paper Birch (*Betula neoalaskana*) buds be used to predict when buds will burst? Does weather and temperature dictate budburst?” is sought. Buds are collected and weighed immediately after collection and after forty eight hours of being in a drying oven. The weight of the wet and dried buds allows for a calculation of moisture content. Using a weather station, access to temperature and cloud and cover readings weather is monitored. Using these variables of moisture content and weather and temperature a prediction is made on the budburst date (budburst being defined as the emergence of tiny leaves from buds on 3 locations on the tree).

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Alaska Phenology Study

Problem:

Can moisture content of Alaska Paper Birch (*Betula neoalaskana*) buds be used to predict when buds will burst? Does weather and temperature dictate budburst?

Hypothesis:

Based on previous results of bud bursts correlation to moisture content:

Year	Moisture Content of Bursting Alaska Paper Birch
2009	54%
2010	48%
2011	49.16%
2012	59.52

Because of dry and cold temperatures, buds should burst on the 3rd of May with a 65% moisture content.

Equipment:

- 2 plastic bags
- 2 paper bags
- Scale (measuring to .001g)
- Drying oven
- Budburst data sheet
- Thermometer
- Weather station/access to temperature, cloud and cover readings
- Budburst protocol data sheet
- Surveyors tape

Experimental Procedure:

1. Gather all the equipment listed above
2. Go out to tree test site around Mat-Su Career and Technical High School and locate two trees with at least 10 buds on each tree
3. Pluck buds off of first tree and place in plastic bag one
4. Pluck buds off of tree two and place in plastic bag two.
Keep each tree sample separate, remove from bag
5. Using a milligram electronic scale weigh the first trees 10buds
6. Record on data sheet
7. Place sample in paper bag one

8. Using milligram electronic scale measure tree two's 10 bud sample
9. Repeat steps 7 and 8 with sample 2
10. Place both bags in the drying oven at 140F
11. After 48 hours remove buds from drying oven
12. Weigh the buds from sample one and record weight on data sheet
13. Repeat step 13 for sample two
14. Discard of buds
15. Determine the moisture content
16. Repeat steps 1-16 two times per week

Data:

Bud Burst Protocol

Date	Tree #1		Tree #2	
	Are tiny leaves emerging?	Can budburst be seen on 3 locations on the tree?	Are tiny leaves emerging?	Can budburst be seen on 3 locations on the tree?
4/7	No	No	No	No
4/13	No	No	No	No
4/15	No	No	No	No
4/17	No	No	No	No
4/22	No	No	No	No
4/24	No	No	No	No

Bud Burst Data

Date	Temp F	Tree Species	Wet Wt.	Dry Wt.	% Moisture	Weather Conditions
4/7	24F	<i>Betula neoalaskana</i>			35%	Snowing-10inches
4/7	24F	<i>Betula neoalaskana</i>			37%	Sunny
4/13	20F	<i>Betula neoalaskana</i>	1.148	.73	36.4%	Sunny
4/13	20F	<i>Betula neoalaskana</i>	.418	.275	34.20%	Sunny
4/13	20F	<i>Betula neoalaskana</i>	.444	.286	35.59%	Sunny
4/13	20F	<i>Betula neoalaskana</i>	.536	.331	38.24%	Sunny
4/15	32F	<i>Betula neoalaskana</i>	.098	.045	54.08%	Mostly Sunny 8mph
4/15	32F	<i>Betula neoalaskana</i>	.150	.077	26.66%	Mostly Sunny 8mph
4/15	32F	<i>Betula neoalaskana</i>	.173	.68	38.73%	Mostly Sunny 8mph
4/15	32F	<i>Betula neoalaskana</i>	.111	.97	43.93%	Mostly Sunny 8mph
4/22	45F	<i>Betula neoalaskana</i>	.253	.156	38.33	Sunny

4/22	45F	<i>Betula neoalaskana</i>	.211	.096	54.50	Sunny
4/24	38F	<i>Betula neoalaskana</i>	.223	.118	47.08	Partly cloudy, 38F
4/24	38F	<i>Betula neoalaskana</i>	.213	.104	51.17	Partly cloudy, 38F
4/24	38F	<i>Betula neoalaskana</i>	.217	.125	42.41	Partly cloudy, 38F
4/24	38F	<i>Betula neoalaskana</i>	.255	.108	57.6	Partly cloudy, 38F

Results:

The time limitations on data collection have shown that budburst will be the latest for the last four years. No sign of budburst on 4/30/13. Moisture content has reached a highest of 57.6%.

Budburst has not occurred during the duration of the experiment.

This presents a definite correlation between temperature and budburst. Despite high moisture content, that which was present in bursting buds in previous years, cold temperatures hinders budburst.

Conclusion:

Experimentation concluded that the moisture percentage is only one contributing factor to budburst. Weather and temperature can prohibit buds from bursting, shown in the buds being

A greater time allotment time to record budburst would be and improvement to this experiment. Seasonal and yearly weather and temperature variables define the parameters of time needed for budburst.