Forage Fact # 28

Date:
March 2004

What did we learn from the alfalfa winterkill survey ?

Factors of Alfalfa Winterkill

Producers can control:

* Soil fertility
* Timing of cutting hay
* Timing of grazing
* Severity of grazing
* Variety of alfalfa
* Age of field

More difficult to control:

* Snow cover
* Icing over & chinook winds
* Exposure to wind
* Frost pockets
* Landscape & drainage

Why a winterkill survey?

In the spring of 2001, there were many calls from ranchers and farmers who were concerned about legume winterkill in their fields. In response, the Peace River Forage Association of BC partnered with the BC Ministry of Agriculture, Food and Fisheries to organize the resources to undertake a three year project.

Tom Pittman, Jim Forbes and Sandra Burton developed a methodology for the winterkill surveys. They tested and adapted a rapid evaluation of alfalfa frost injury used by Ted Moore, BCMAFF.

Tom Pittman and Jim Forbes pool their knowledge with the experience of ranchers like Horst David to refine the survey methodology.

"Our newer alfalfa stands yield okay and have reasonable quality. But our feed tests show a steady decline in quality after 4 years. Why are we getting shorter longevity of our legume stands?"
Brian Clarke, Baldonnel

Len and Molly Donaldson show Sandra Burton the extent of the winterkill in their alfalfa fields in 2002.

How was the survey done?

Fields were surveyed in several areas of the Peace including: Prespatou, Fort St John-Montney, Hudson's Hope, Baldonnel, Dawson Creek-North Rolla, Tomslake, and Groundbirch-Progress.

In 2001, over 20 fields were surveyed; and in 2002, over 15 fields were surveyed. In 2003, there were no calls about winterkill.

The **objective of this forage fact** is:

⇒ to share some of the experiences and lessons learned during the winterkill survey.

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V1G 4H9

Peace River Forage Association of British Columbia

Measuring plant densities and heights of alfalfa stands.

How were the fields assessed for winterkill?

Fields were assessed for winterkill at 10 to 15 randomly selected spots in each of the fields in the survey. The assessment was a 6 step process:

1. Measuring plant density and height,
2. Counting the number of shoots and assessing vigour of leaves,
3. Assessing crown vigour,
4. Rating the ease of peeling of root bark
5. Slicing the roots and rating the inner core for discolouration
6. Sampling soils

Steps 1 & 2 determined the general vigour and health of the stand. As a guideline densities of less than 6-10 plants per sq. ft. require reseeding.

Steps 3 , 4 & 5 were a rapid evaluation of frost injury. Crowns with white, turgid & pink tipped buds rated more viable than discoloured, shrivelled & dry tips. Root bark that resisted peeling indicated less injury than if it peeled easily. Root interiors that were white or cream with no discolouration were rated healthy. In contrast, root interiors that were yellow or brown with scarring or diseased areas were given a low number for predicated survivability.

Assessing plant vigour by counting shoots and examining leaves .

Step 6 was a modification to the survey method. This was to include composite soil samples from both areas of poor and vigourous growth.

Assessing budding vigour of the crown.

Rating roots for ease of peeling root bark and discoloration of inner root core. Compare unhealthy diseased roots (photo on the left) to healthy roots (photo on the far right).

The mandate of Peace River Forage Association of BC is to develop forage opportunities that ….. are sociologically, ecologically, and economically sound.

What role does climate play?

Climatic factors can cause winterkill in a number of ways. South west slopes that are exposed to chinook winds can lose their protective snow cover. Surfaces may dry out or thaw-freeze cycles can pop the crowns out of the ground. Another factor is when slopes melt and then ice over so that there is no oxygen for the crowns.

In late fall, frost may collect in pockets on lower slopes. New seedings that have been cut late may not have enough crown and root stores to weather the cool temperatures. Once their top growth is damaged, they have little resources to recharge their crown and root stores.

The lower wetter slopes often are first to show a decline in the alfalfa percentage in the fields.

Does haying and grazing management affect winterkill?

Burnem Grant samples field with Tom Pittman.

Timing of cutting hay can affect winter hardiness. If hay is cut between mid August and mid September in most areas of the Peace, there is not sufficient time for the plants to recover and prepare for winter.

Similarly, timing and severity of fall grazing can also affect winterkill. The hoofs of grazing livestock can damage the crowns of the plants. Grazing in early fall just before plants go in dormancy is not recommended since the plant is unable to replenish its reserves for winter survival. Grazing late in October does not damage the plants themselves, but there is less stubble for trapping snow. Ranchers can manage grazing of domestic livestock to prevent this, but they often have less control of wildlife grazing.

Are some varieties more hardy?

There were dramatic differences among alfalfa varieties in terms of winter injury. Multifoliate varieties and those with spreading root systems showed more signs of winter injury. Some varieties were quite variable in their response to winterkill. Others were uniform but slower to grow in spring, rather than actually winterkilled. This topic is described in more detail in Forage Fact # 6.

Varieties like Peace (on the left half of photo) had better and more uniform winter hardiness than several new varieties (on the right half) at Clarke's demonstration.

The alfalfa winterkill survey was a part of the 3 year project called:
Forage Nutrient Management for Longevity. Check out the website at www.peaceforage.bc.ca

Thank you to the survey participants:

Prespatou:
Cornelius Braun
Abe Loewen

Fort St. John - Montney:
Paul & Mike Cowger
Hans Ostergaard

Baldonnel:
Brian Clarke
Gord Ouellette

Dawson Creek-North Rolla:
John Kendrew
Double M Ranch
Len Donaldson

Groundbirch-Progress:
Tony Verbruggen
Chris Odden
Dan Schleppe
Chuck Sutherland

Tomslake:
Burnem Grant
Horst David

How does an idea grow into a R & D project?

1. Idea/issue discussed.
2. Contact person from the Board of Directors.
3. Industry funds organized from membership fees, cooperators or agri-businesses.
4. Matching funds from an appropriate government source.
5. People contracted to carry out the work.
6. Reporting to funding partners/membership.

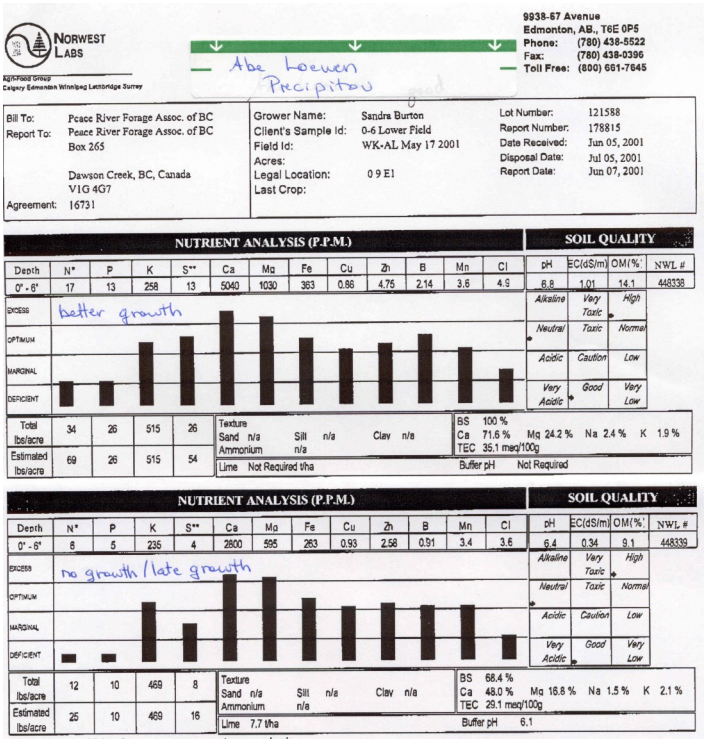
Is it winterkill or is it starvation?

During the winterkill survey in 2001: paired soil samples were taken at 5 fields. Each sample was a composite of 15 to 20 samples. One composite sample was from the areas with poor growth, while the other composite was from the areas with better growth.

The results were surprising. The areas with poorer spring growth consistently had lower levels of macro nutrients such as nitrogen (N), phosphorus (P), potassium (K) and sulphur (S). Lower levels of chlorine (Cl) were also common. Boron (B) is another nutrient important for winter survival.

In 2002, further paired sampling supported these results.

Abe Loewen of Prespatou quizzes Tom Pittman and Bill Greenhalgh, BCMAFF as they assess his clover field for winterkill.



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Abe Loewen
Precipitou

Bill To:	Peace River Forage Assoc. of BC	Grower Name:	Sandra Burton
Report To:	Peace River Forage Assoc. of BC Box 265 Dawson Creek, BC, Canada V1G 4G7	Client's Sample Id:	0-6 Lower Field
		Field Id:	WK-AL May 17 2001
		Acres:	
		Legal Location:	0 9 E1
		Last Crop:	
Agreement:	16731		

Lot Number:	121588		
Report Number:	178815		
Date Received:	Jun 05, 2001		
Disposal Date:	Jul 05, 2001		
Report Date:	Jun 07, 2001		

NUTRIENT ANALYSIS (P.P.M.)

Depth	N*	P	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	Cl
0" - 6"	17	13	258	13	5040	1030	363	0.86	4.75	2.14	3.6	4.9
Total lbs/acre	34	26	515	26								
Estimated lbs/acre	69	26	515	54								

SOIL QUALITY

pH	EC(dS/m)	OM(%)	NWL #
6.8	1.01	14.1	448338

Alkaline / Very Toxic / High
Neutral / Toxic / Normal
Acidic / Caution / Low
Very Acidic / Good / Very Low

better growth

Texture
Sand n/a Silt n/a Clay n/a
Ammonium n/a
Lime Not Required t/ha

BS 100 %
Ca 71.6 % Mg 24.2 % Na 2.4 % K 1.9 %
TEC 35.1 meq/100g
Buffer pH Not Required

NUTRIENT ANALYSIS (P.P.M.)

Depth	N*	P	K	S**	Ca	Mg	Fe	Cu	Zn	B	Mn	Cl
0" - 6"	8	5	235	4	2800	595	263	0.93	2.58	0.91	3.4	3.6
Total lbs/acre	12	10	469	8								
Estimated lbs/acre	25	10	469	16								

SOIL QUALITY

pH	EC(dS/m)	OM(%)	NWL #
6.4	0.34	9.1	448339

Alkaline / Very Toxic / High
Neutral / Toxic / Normal
Acidic / Caution / Low
Very Acidic / Good / Very Low

no growth / late growth

Texture
Sand n/a Silt n/a Clay n/a
Ammonium n/a
Lime 7.7 t/ha

BS 68.4 %
Ca 48.0 % Mg 16.8 % Na 1.5 % K 2.1 %
TEC 29.1 meq/100g
Buffer pH 6.1

Soil test results from 2 areas in Abe Loewen's field: where the growth was better (upper bar graphs) and where the growth was poor (lower bar graphs). Note: first 4 bars starting on left of form are N, P, K, S

Summary

In summary, there are several factors affecting winter survival of alfalfa and clovers.

One of the easiest factors ranchers can change is the soil fertility levels of their fields. They also have control over the timing and severity of grazing or hay cutting. As well, they can choose winter hardy varieties.

However, the factors that are the more difficult to change are snow cover, wind, icing conditions, frost pockets, landscape, drainage and wildlife pressure.

Compiled by: Sandra Burton, Lee Bowd, Julie Robinson and Laurie Wilson in March, 2004.
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