



# CLIMATE CHANGE ADAPTATION PROGRAM



## Selecting Suitable and Adaptive Dryland Forage Crops and Varieties: Project Report

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# Acknowledgements

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**The Project Oversight Committee included:**

- Rayner Oosterhoff
- Jay Bangs
- Megan D'Arcy, Regional District of Bulkley-Nechako
- Catharine Kendall, Eaglet Lake Farmers' Institute
- Serena Black, BC Forage Council
- Chris Zabek, Karen Tabe and John Stevenson, BC Ministry of Agriculture and Food
- Emily MacNair, Harmony Bjarnason and Foster Richardson, Climate Change Adaptation Program

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## Project Objectives and Summary

The project: *Selecting suitable and adaptive dryland forage crops and varieties* supported priorities identified in the *Bulkley-Nechako & Fraser-Fort George Adaptation Strategies*<sup>1</sup>, and next steps led by Bulkley-Nechako & Fraser-Fort George (BNFFG) Agricultural Adaptation working group.

*The following objectives were outlined and achieved:*

- Compile (sub-regional) information on current species/variety selections and adaptation priorities;
- Identify new varieties with promise for regional adaptation;
- Develop region-specific forage suitability resources;
- Evaluate and share the Forage U-Pick (decision support tool) within the region; and
- Encourage producers to consider conducting variety trials.

*The following project outputs were outlined and achieved:*

- A producer and seed company survey was conducted in March-April 2022. 58 producer respondents and five seed dealers/agronomists completed the survey;
- Three workshops on selecting suitable dryland forages in the BNFFG were planned and completed:
  - Prince George – 11 attendees
  - Vanderhoof – 7 attendees
  - Smithers – 16 attendees
- A forage selection guide with sub-regional suitability for the BNFFG areas was developed and prepared for distribution;
- The following forage factsheets were compiled and prepared for distribution:
  - Alfalfa factsheet
  - Brome grass factsheet
  - Non-bloat legumes factsheet
  - Forages with potential factsheet
- The Forage U-Pick tool was introduced and evaluated during the 3 regional workshops:
  - Three case studies were developed.
  - One “how-to” video was produced.

## Project Background

Climate change projections across the Bulkley-Nechako and Fraser-Fort George region include warmer and drier summer conditions and shifting precipitation patterns that include more extreme precipitation events. Both management practices and production decisions – such as selecting suitable and resilient crop types and varieties – will assist producers to manage through increasingly variable and extreme conditions.

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<sup>1</sup> <https://bcclimatechangeadaptation.ca/wp-content/uploads/2022/Resources/RegionalStrategies-BNFFG.pdf>

A previous project<sup>2</sup> (undertaken in 2020) in the Bulkley-Nechako and Fraser Fort-George region focused on providing knowledge transfer for best practices for water management. An important element of this project was consultation with producers across the region about informational needs and priorities relating to water management. Identifying water management strategies for dryland farms was one of the top informational/knowledge transfer priorities identified during this project. The project recommended exploring suitable crops and varieties for dryland production, specifically, deepening knowledge of species and variety performance within the region.

Producers are very familiar with the importance of selecting suitable forage crops but as conditions change, the species and varieties that have been reliable in the past may be less productive or suitable for changing and variable future conditions. Complicating crop selection is the constantly evolving process of variety and crop development. Some of these varieties may prove more resilient to the changing or challenging conditions for producers in various areas of the Bulkley-Nechako and Fraser Fort-George region (BNFFG). Information about varieties (suitability, performance, etc.) rests with the seed companies and must be sought out. In addition, varieties haven't been tested in the region, which means local trials may be required to assess their suitability in BNFFG region.

There are some existing resources – including the BC Rangeland Seeding Manual<sup>3</sup> and the more recently developed Forage U-Pick decision support tool<sup>4</sup> – to aid producers with choosing suitable crops. There is also a resource to support producers with establishing on-farm trials<sup>5</sup>. These resources provided valuable background work to support the activities of this project.

The project was completed in phases of activity. The first phase included surveys, interviews and review of relevant resources. In partnership with the BC Forage Council, a survey was developed and distributed to forage producers to gather information about the current species and varieties being grown in various parts of the region, along with future plans for seeding. Additional research was conducted (via outreach to seed companies) about new varieties that may be suitable for dryland production within the region/sub-regions. Existing resources for supporting crop selection were also reviewed to identify the most relevant and valuable content.

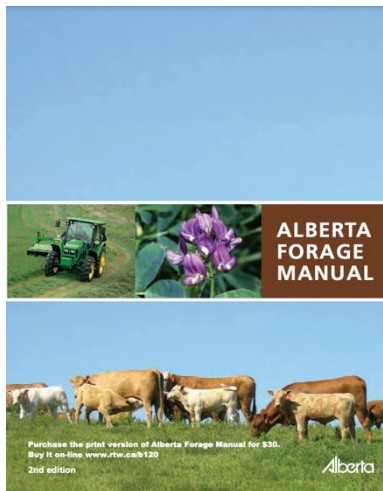
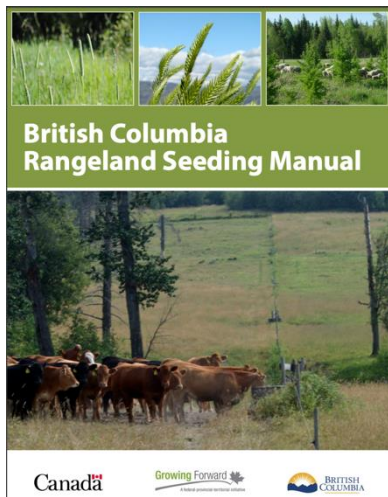
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<sup>2</sup><https://bcclimatechangeadaptation.ca/wp-content/uploads/2022/Resources/BF01-Project-Report-Knowledge-Transfer-Adoption-Water-Management-Best-Practices-2021.pdf>

<sup>3</sup> [https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/rangelands/bc\\_rl\\_seeding\\_manual\\_web\\_single\\_150dpi0904.pdf](https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/rangelands/bc_rl_seeding_manual_web_single_150dpi0904.pdf)

<sup>4</sup> <https://upick.beefresearch.ca/>

<sup>5</sup> <https://bcclimatechangeadaptation.ca/wp-content/uploads/2022/Resources/FI03-On-Farm-Demonstration-Research-Guide.pdf>



## Forage Crop Production Guide

### Forage Species Selection

Selection of an appropriate forage species is an important first step in successful forage production. Factors such as soil type, salinity, flooding, desired season of use, longevity of species, end use, quality, yield potential and invasiveness should be considered to make the best choice possible. Descriptions of several forage species adapted to Saskatchewan growing conditions are given below.

### Grasses

Smooth bromegrass (*Bromus inermis*) is a long-lived, aggressively creeping grass best suited to hay production. It is tolerant of moderate periods of spring flooding, saturated soils and saline conditions. It is recommended for use in the Dark Brown, Black and Gray soil zones (Figure 2). Smooth bromegrass can be invasive in some areas, spreading by seed and rootstocks.

At the height of natural areas, competition which is caused by introduced species, consider planting a less aggressive species when seeding adjacent to natural areas and rangeland.

Meadow bromegrass (*Bromus spretus*) is a widely creeping pasture grass with rapid regrowth characteristics. Meadow bromegrass can be used for hay, but harvest can be difficult due to its basal growth habit. It is similar in adaptation to smooth bromegrass, but not quite as hardy under stress conditions. Because few seed heads are produced in older stands, feed quality remains high. Hybrid bromegrass is the result of a cross between smooth bromegrass and meadow bromegrass.

Hybrid bromegrass has growth characteristics and adaptation intermediate to its parental lines. Hybrid bromegrass regrows more rapidly than smooth bromegrass and has greater hay yields than meadow bromegrass.

Alta wildrye grass (*Leymus amygdali*) is a long-lived, hardy, saline-tolerant pasture grass that is moderately creeping, but has a branched appearance in the field. It is well adapted to medium and heavy textured soils, but is resistant of spring flooding and saturated soils. It is drought tolerant and adapted to all soil zones. Alta wildrye grass cores well for good fall and winter forage quality. It is difficult to establish, due to poor seedling vigour.



EXAMPLES OF EXISTING RESOURCES ON FORGE CROP SELECTION: [British Columbia rangeland and seeding manual](#), [Alberta Forage Manual](#), AND [Saskatchewan Forage Crop Production Guide](#).

During the next step of activities, three forage selection workshops were delivered across the region. The workshops were used to share applied knowledge on selecting suitable forage, testing the U-Pick tool, and encouraging producers to consider on-farm research. Workshops were delivered in collaboration and with support from the BC Forage Council. The workshops provided valuable input on resource gaps as identified by end-uses and offered feedback on an early version of the forage selection guide.

Following completion of the workshop, a set of accessible and regionally specific informational resources were created and took the form of factsheets, case studies, and a how-to video. These were built from existing resources but meant to address some critical information gaps and build additional content for dryland production, including regional considerations and conditions. The resources were prepared, reviewed, and readied for print & online distribution.

## Dryland Forage Producer Survey

A dryland forage survey was delivered to producers in the Bulkley-Nechako and Fraser-Fort George (BNFFG) areas between March and April 2022. The survey was promoted and shared through various networks within the regional districts, the BC Forage Council, local Farmers' Institutes, and various individuals. A total of 58 survey responses were collected. See Appendix A for a summary of the results.

## Dryland Forage Seed Dealer/Agronomist Survey

In conjunction with the BNFFG producer survey, forage seed dealers and/or forage seed agronomists serving the area were also surveyed. These surveys were conducted over the phone during March and April 2022. The goal was to hear the perspectives of forage seed dealers and their experience of what forage growers in the BNFFG area are looking for and what gaps as well as trends are observed. The response rate of five was low and is reflective of the lack of on-site forage seed representatives in the BNFFG area. Representatives of the main forage seed dealers cover large territories with the representative commonly living outside of the BNFFG region. Smaller seed dealers and local independent seed producers also provide forage seed for the BNFFG region. A

couple of respondents only provided short responses, indicating that they did not feel there were any notable differences in how they would provide service to the BNFFG when compared to their home territory. This is an example of a disadvantage BNFFG producers may face when seed dealers are not located within the region and therefore have less familiarity with regional soil and climatic differences. A summary of the results from the seed dealer and agronomist survey can be found in appendix B.

## Dryland Forage Selection Workshops

Three workshops were held to share information on perennial forage selection and on-farm forage trials in the Bulkley-Nechako and Fraser-Fort George area. The following event poster and agenda were used to promote the event. The event was shared through various networks within the regional districts, the BC Forage Council, local Farmers' Institutes, and various individuals. The event was also highlighted as part of the Growing Opportunities – an RDBN Podcast in Episode 3: Forage<sup>6</sup>.



EAGLET LAKE FARMERS' INSTITUTE  
**B.C. FORAGE COUNCIL**

# Dryland Forage Workshop

Selecting Suitable Forage Crops for the Bulkley-Nechako & Fraser-Fort George Area

**Prince George** - Pineview Community Hall, 6470 Bendixon Rd.  
 APRIL 28 | 1-4PM

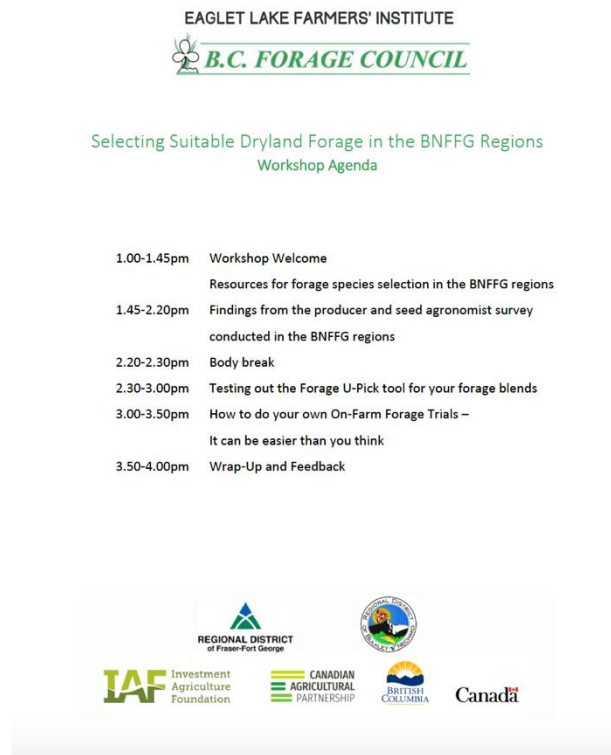
**Vanderhoof** - Forestry Office, 1560 Hwy 16  
 APRIL 29 | 1-4PM

**Smithers** - Round Lake Community Hall  
 APRIL 30 | 1-4PM

Topics Include:  
**Forage Selection Resources**  
**Results from the BN-FFG Forage Producer Survey**  
**How to use the Forage U-Pick Tool**  
**On-Farm Forage Trials - How To Get'R Done**

To register contact Nadia Mori:  
 nadia.mori@usask.ca  
 1-866-516-3101

Logos at the bottom: IAF Investment Agriculture Foundation, CANADIAN AGRICULTURAL PARTNERSHIP, REGIONAL DISTRICT of Fraser-Fort George, BRITISH COLUMBIA, and Canada.



EAGLET LAKE FARMERS' INSTITUTE  
**B.C. FORAGE COUNCIL**

### Selecting Suitable Dryland Forage in the BNFFG Regions Workshop Agenda

- 1.00-1.45pm Workshop Welcome
- Resources for forage species selection in the BNFFG regions
- 1.45-2.20pm Findings from the producer and seed agronomist survey conducted in the BNFFG regions
- 2.20-2.30pm Body break
- 2.30-3.00pm Testing out the Forage U-Pick tool for your forage blends
- 3.00-3.50pm How to do your own On-Farm Forage Trials – It can be easier than you think
- 3.50-4.00pm Wrap-Up and Feedback

Logos at the bottom: IAF Investment Agriculture Foundation, CANADIAN AGRICULTURAL PARTNERSHIP, REGIONAL DISTRICT of Fraser-Fort George, BRITISH COLUMBIA, and Canada.

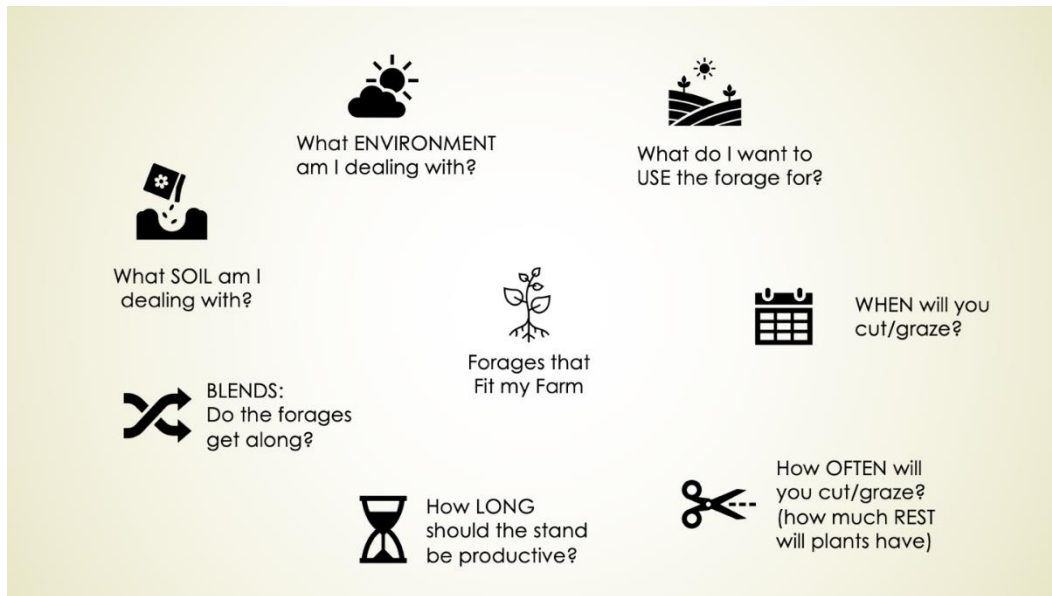
### WORKSHOP POSTER AND AGENDA

The first workshop was held in **Prince George** at the Pineview Community Hall on Thursday afternoon, April 28. With 13 registrations and **11 attendees** we were off to a good start to the workshop tour. The **Vanderhoof** Forestry Office hosted us for the second workshop on Friday, April 29. With seven registrations and **seven attendees**, although they were not the same individuals, this was the smallest group. Nevertheless, attendees were actively participating and engaged with sharing stories and feedback. The third and final workshop was held at the Round Lake Community

<sup>6</sup> <https://www.rdbn.bc.ca/departments/agriculture/growing-opportunities-rdbn-ag-newsletter-podcast>

Hall near **Smithers** on Saturday, April 30. A slight hiccup with a prior hall rental required an impromptu cleanup of the leftovers of a rather rowdy bachelorette party. Many helping hands made it possible for the workshop to start on time. In recompense, the Round Lake Hall manager provided a full refund of our damage deposit and did not charge us for the hall rental. With nine registrations and **16 attendees** this was our largest turnout.

The first three presentations within each workshop were prepared and delivered by Nadia Mori. The afternoon was wrapped up with a final presentation prepared and delivered by Serena Black. Attendees were asked to complete a voluntary feedback survey; results of this survey are available in appendix C.



Seven Steps to Forage Selection – prepared and presented during the workshop by Nadia Mori PAg.

## Conclusion & Recommendations

### Project In Review

The project deliverables were completed over the span of January 2022 to February 2023.

The following project deliverables were fulfilled:

- Project work plan
- Producer and Seed Agronomist questionnaires and survey summaries
- Regional suitability resource in the form of a forage selection guide
- Species/variety fact sheets (4)
- U-Pick case studies (3)
- Regional forage selection workshops (3)

Two additional project resources and deliverables included:

- Podcast interview Megan D’Arcy for the agriculture focused *Growing Opportunities* podcast of the Regional District of Bulkley Nechako.
- A Forage U-Pick Tool how-to video tutorial



## Conclusion

Overall, the project uncovered several information gaps around forage selection in the BNFFG area. Ecoregion variability within the subregions of the area make it challenging to provide blanket recommendations for producers in the area. Not surprisingly, producers have a strong appetite for more localized demonstration of forage crops and their suitability to various environmental factors such as soil and weather conditions. With the loss of regional forage variety trials, producers are encouraged to conduct their own field demonstrations. Some have taken to the challenge more readily than others. Many still feel overwhelmed by the additional request placed on them and would benefit from more hands-on support in getting started with simple on-farm trials. Producers are most likely to adopt practices successfully demonstrated by peers. If adoption of certain beneficial management practices is desired, additional resources should be channeled into facilitation of peer-to-peer learning. This could take the form of grazing clubs, field demo days, and/or farm tours.

## Future Project Ideas and Recommendations

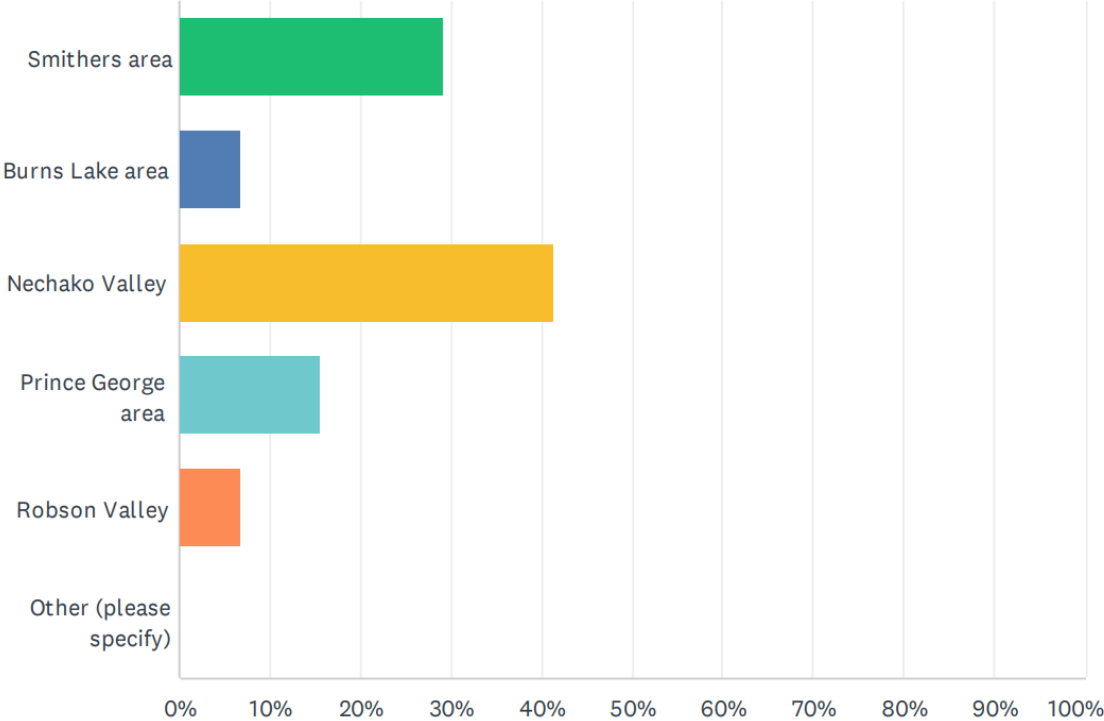
- Regional forage variety trials
- Establish local grazing clubs
- Region specific pasture rejuvenation recommendations
- Supporting producers with starting on-farm research demonstrations
- Peer-to-peer learning through field days and farm tours
- Collaborate with Forage U-Pick tool team in updating region specific forage suitability.

Appendices

Appendix A – Producer Survey Results

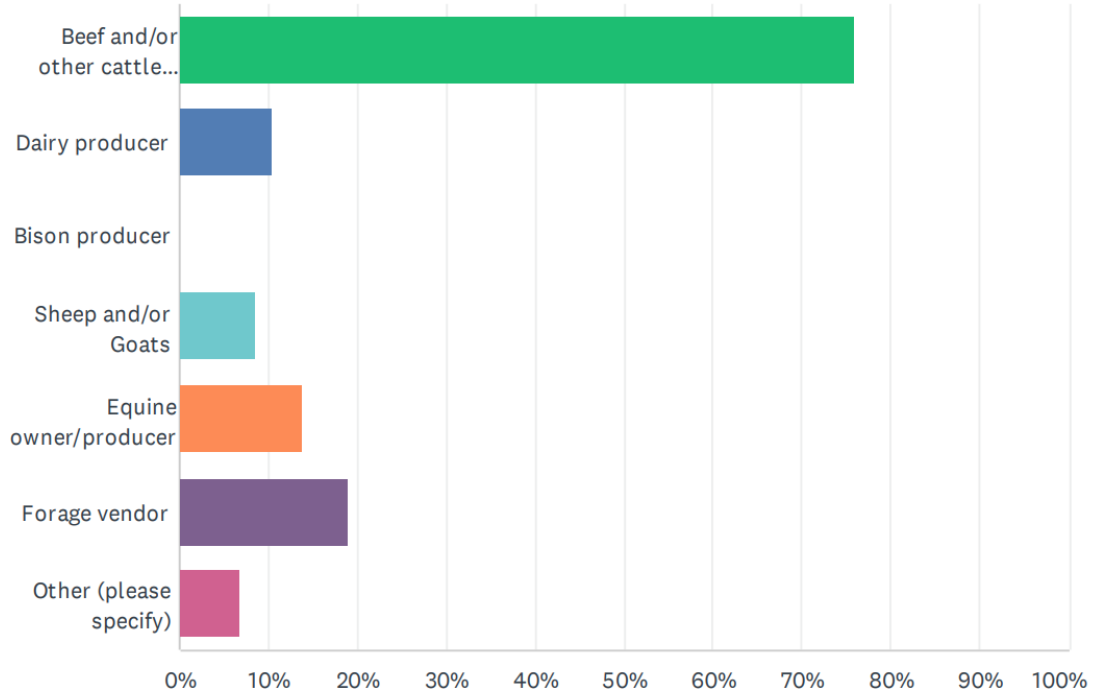
### Q1 Which Sub-Region are you closest to?

Answered: 58 Skipped: 0



## Q2 Please select the type of your main operation.

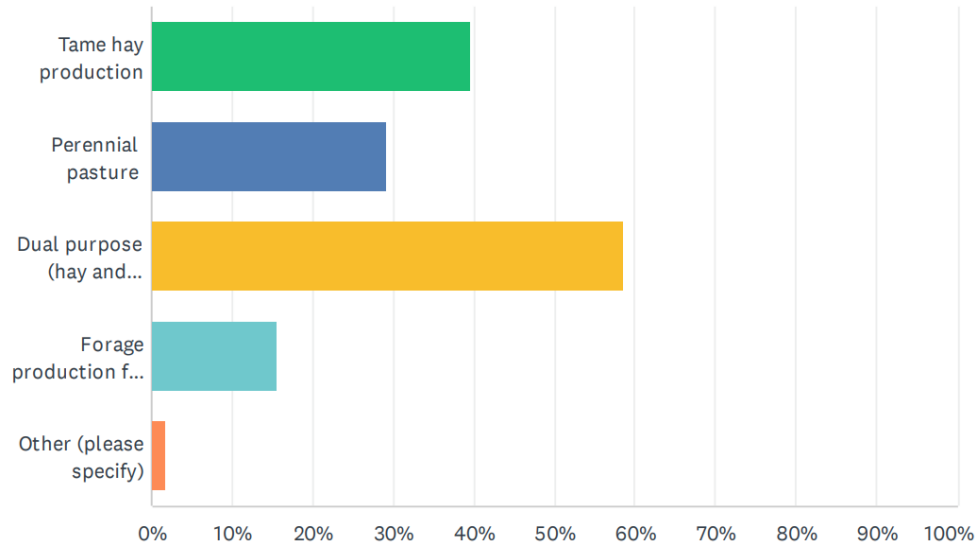
Answered: 58 Skipped: 0



#	OTHER (PLEASE SPECIFY)	DATE
1	Pigs	4/5/2022 6:59 AM
2	Dexter cattle for beef	3/30/2022 9:00 PM
3	Alpacas, bees	3/25/2022 6:47 PM
4	I no longer own cattle. I do custom grazing for other producers	3/23/2022 6:32 PM

### Q3 What is the primary use of forages as part of your operation?

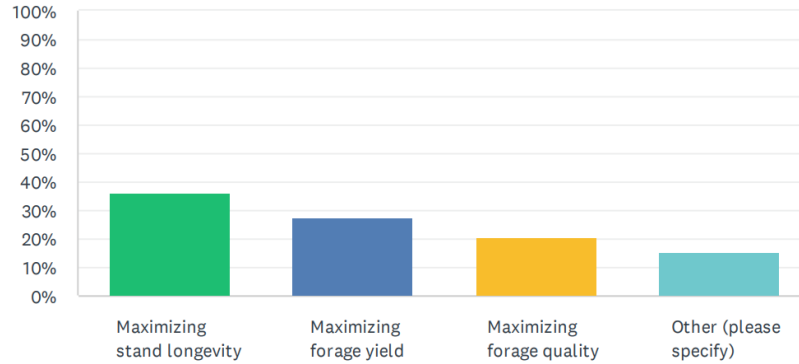
Answered: 58 Skipped: 0



#	OTHER (PLEASE SPECIFY)	DATE
1	Cover cropping for soil building	3/23/2022 6:01 PM

## Q4 What is your highest priority goal for your dryland (non-irrigated) forage stand?

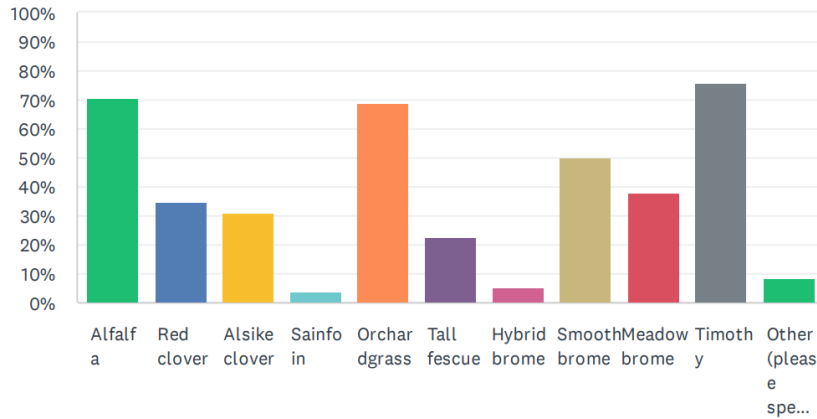
Answered: 58 Skipped: 0



#	OTHER (PLEASE SPECIFY)	DATE
1	All the above	4/4/2022 12:07 PM
2	quality yes, and also getting the cows and horses off the fields into the woods. We are fencing 150 acres of bushland and will push them out to forage and rotate them into the 3 fields to maximize forage yields	3/30/2022 9:00 PM
3	Low sugar, suitable for horses	3/26/2022 1:06 PM
4	I would like to build up my soil health, while still being able to take a crop of hay most years.	3/24/2022 2:57 PM
5	I'm looking for quality, yield & longevity - not just one	3/23/2022 6:32 PM
6	All of the above	3/16/2022 1:15 PM
7	Maximizing yield and quality	3/15/2022 9:58 AM
8	all of above	3/13/2022 10:04 PM
9	Intend to harvest quality but usually due to weather end up with yield	3/13/2022 2:37 PM

## Q5 Which perennial dryland (non-irrigated) forage species and varieties are your go-tos on your operation?

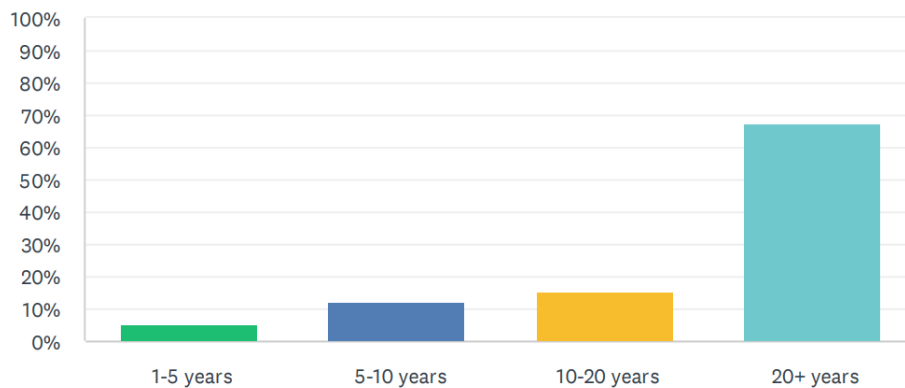
Answered: 58 Skipped: 0



#	OTHER (PLEASE SPECIFY)	DATE
1	we bale graze and seed into the leftover rings of hay	3/30/2022 9:00 PM
2	Millet, sorghum sudan, buckwheat, brassicas	3/23/2022 6:01 PM
3	crested wheatgrass, white dutch clover	3/23/2022 9:12 AM
4	trefoil	3/17/2022 10:42 PM
5	Festulolium grass was seeded in 2021, had a good catch	3/15/2022 9:58 AM

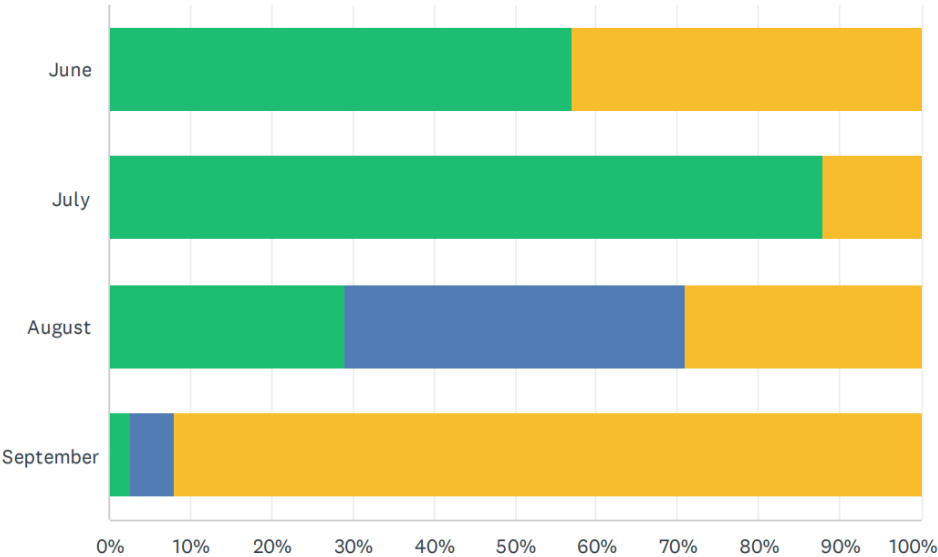
## Q6 For how many years have you been growing dryland forages?

Answered: 58 Skipped: 0



# Q7 When and how do you normally harvest your dryland forage?

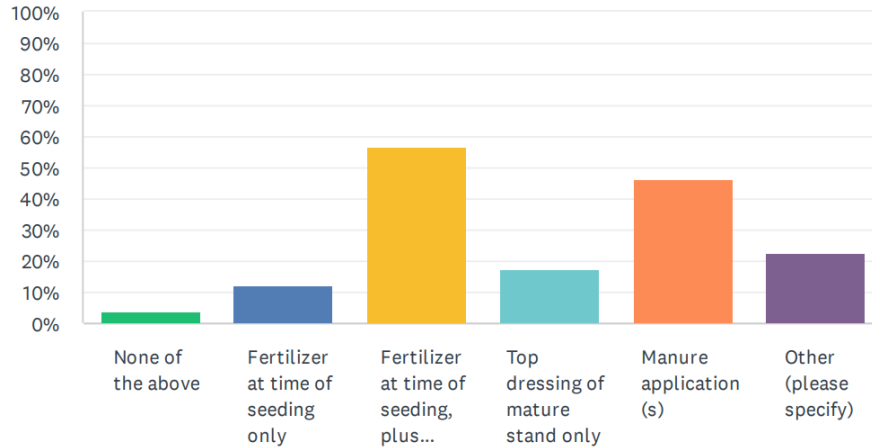
Answered: 57 Skipped: 1



1st cut hay ... 2nd cut hay... Grazing (if ...

## Q8 What nutrient management practices do you use for your forage stands? (select all that apply)

Answered: 58 Skipped: 0

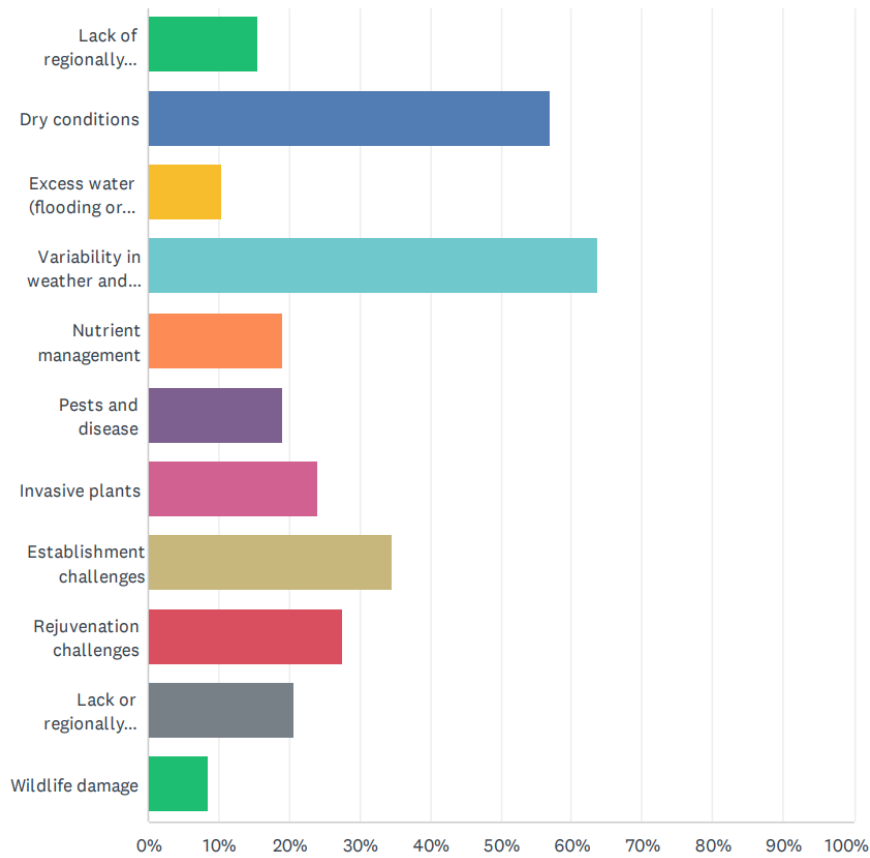


#	OTHER (PLEASE SPECIFY)	DATE
1	manure application via winter feeding cattle on fields/pastures	4/1/2022 7:03 AM
2	bale grazing so manure is distributed all over the fields	3/30/2022 9:00 PM
3	fertilizer application done annually as top dress but considering liquid or banding as a more effective option	3/30/2022 4:01 PM
4	Bale grazing	3/29/2022 8:29 PM
5	we like to Fall fertilize hayfields in October just before snow comes	3/28/2022 8:06 PM
6	Application of fertilizer annually	3/25/2022 9:46 PM
7	Feed on fields	3/25/2022 8:06 AM
8	Manure application, however, it is rather sparsely applied, so I don't know that it would really qualify.	3/24/2022 2:57 PM
9	Strip grazing/cell grazing to maximize cattle manure and urea	3/23/2022 6:32 PM
10	Leave brassica tubers in ground to store nutrients	3/23/2022 6:01 PM
11	bale feeding on the field Green manure	3/13/2022 2:37 PM
12	Inline fertilizer for new seeding	3/11/2022 12:45 PM
13	Fertilizer Application in the Fall	3/11/2022 12:38 PM



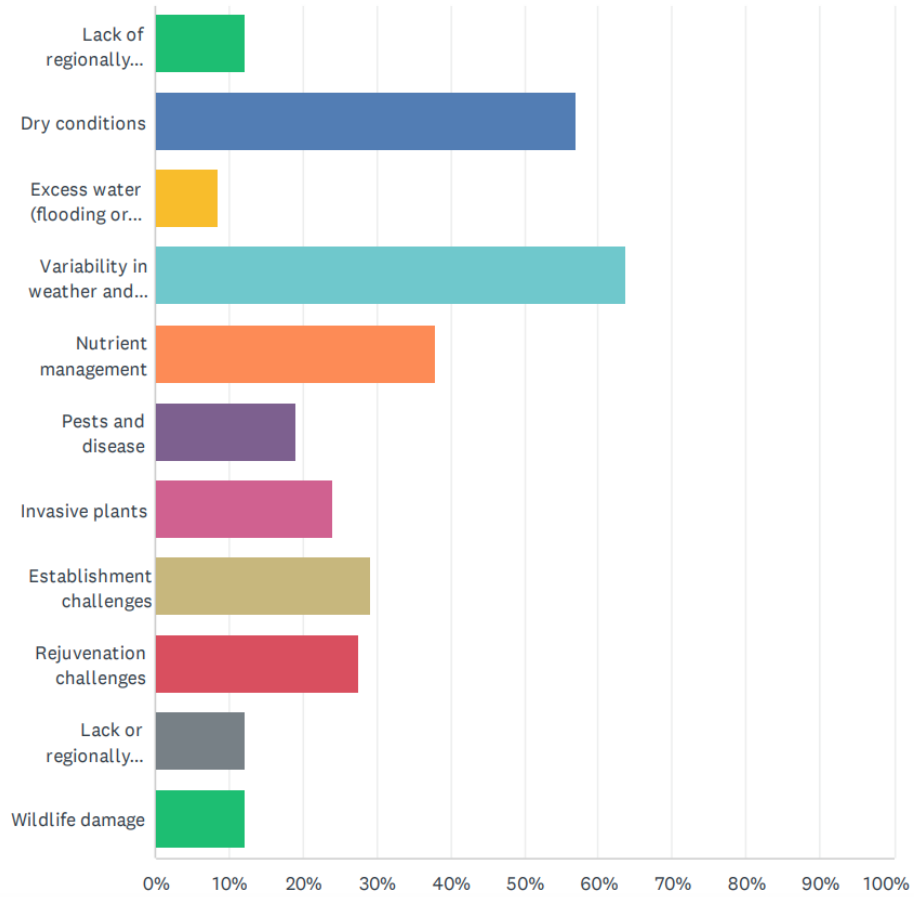
# Q9 In the past, what has been your TOP 3 challenge to forage production?

Answered: 58 Skipped: 0



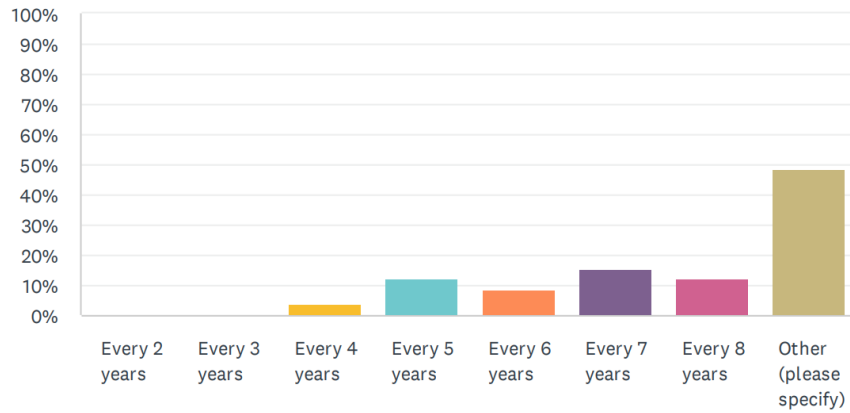
# Q10 In the Future, what do you expect to be your TOP 3 challenge to forage production?

Answered: 58 Skipped: 0



## Q11 On average, how frequently do you plan to rejuvenate your forage stands?

Answered: 58 Skipped: 0



#	OTHER (PLEASE SPECIFY)	DATE
1	Unsure as of now	4/5/2022 6:59 AM
2	every 10 yrs	4/4/2022 12:07 PM
3	every 10 years	4/1/2022 10:02 PM
4	we are trying to build organics to healthy soil with minimal disturbance	3/31/2022 9:56 AM
5	ours is constant - and until we can push the animals out into the bushy areas, our challenge is mainly keeping the grass ahead of them. We don't do paddock rotations because we have other goals than just maximizing beef yields per acre	3/30/2022 9:00 PM
6	our goal is to have a stand last as long as possible before reseeding, but rejuvenation methods could include banding and aeration to prolong the longevity of a stand. considering the challenges and costs of reseeding, longevity of a stand is critical to longterm financial success!	3/30/2022 4:01 PM

7	only when needed by production declines	3/30/2022 2:35 PM
8	Depending on the success of innovative no till/seeding into perennial stands.	3/29/2022 8:29 PM
9	Unknown	3/29/2022 4:20 PM
10	Some of this depends on the lessee.	3/29/2022 3:39 PM
11	10 to 15 yrs	3/29/2022 10:31 AM
12	regenerative farming practices	3/26/2022 1:06 PM
13	Lots of rock, so when we feel loss of production	3/25/2022 2:01 PM
14	10 to 12 years	3/25/2022 11:40 AM
15	I would like to experiment with no till over seeding every couple of years, but I have not had the chance to try it yet.	3/24/2022 2:57 PM
16	Now that we are strip/cell grazing there is no need. Pastures do it on their own	3/23/2022 6:32 PM
17	Ongoing with overseeding, developing new fields, using regenerative practices	3/23/2022 6:01 PM
18	every 20 plus years	3/23/2022 4:47 PM
19	when production returns fall off, alfalfa plant density dissipates	3/23/2022 9:12 AM
20	3 years annuals and brassicas,5 years in tame hay production then 5 years as perennial pasture.	3/17/2022 10:42 PM
21	it all depends on the yield, have had fields producing 3 tons an ac. that are 20 years old	3/15/2022 9:58 AM
22	10 to 15 yrs	3/13/2022 2:37 PM
23	Whenever production drops enough that it's necessary. Hopefully 10 years	3/12/2022 10:44 AM
24	Depends on longevity of stand, some areas we have rejuvenated in 5 or 6 years, some areas have been consistently producing for 50 years. Our normal plan is 8 to 10 years.	3/11/2022 7:42 PM
25	12 to 18 years	3/11/2022 2:19 PM
26	10+	3/11/2022 12:38 PM
27	As needed/required	3/11/2022 12:32 PM
28	10 plus years	3/11/2022 12:14 PM

## Q12 In your own words, what makes you decide when it is time to rejuvenate a forage stand?

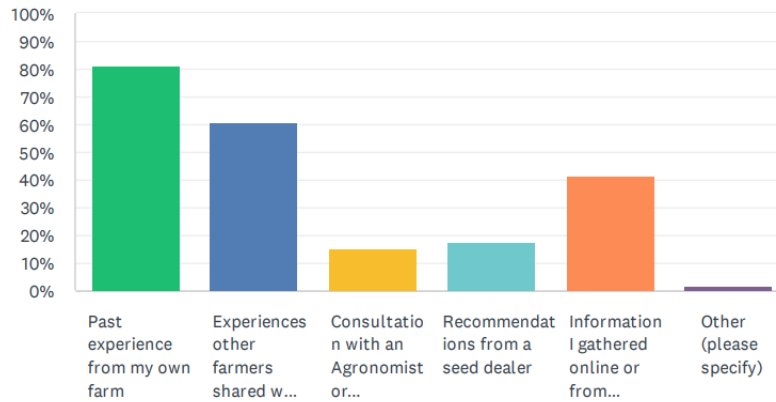
Answered: 55 Skipped: 3

#	RESPONSES	DATE
1	when yield drops to under 1 ton/acre in two consecutive years	4/12/2022 9:37 AM
2	When it needs work.	4/5/2022 6:59 AM
3	when the tonnage drops below 2 ton per acre	4/4/2022 12:07 PM
4	When the crop yield value drops to equal the cost of production	4/1/2022 10:02 PM
5	When field becomes sod bound or the june grass is taking over the field.	4/1/2022 8:08 PM
6	usually when the amount of alfalfa in the stand is diminishing and short grasses are taking over	4/1/2022 7:03 AM
7	Currently rejuvenating 30 year old forage stands. Poorest yielding first. Have not finished rejuvenating all fields yet to start any rotational or decision based 'when it is time'	3/31/2022 4:53 PM
8	weed infestations or loss of soil viability	3/31/2022 9:56 AM
9	see above	3/30/2022 9:00 PM
10	when production reaches and uneconomic level	3/30/2022 7:18 PM
11	we decide based on production of a stand... once yield drops below 60% we replant	3/30/2022 4:01 PM
12	when we notice and are able to quantify a drop in forage quality/soil vitality	3/30/2022 2:35 PM
13	our goal is to rejuvenate every 5 years but due to costs and time constraints we usually rejuvenate every 10 years	3/30/2022 10:17 AM
14	Forage production decline, soil compaction, sod-bound conditions would indicate rejuvenation would be imminent.	3/29/2022 8:29 PM
15	We choose the field/fields that are giving us the worst production and rejuvenate them. We prioritize our irrigated stands as they give a better return.	3/29/2022 6:18 PM
16	Low yield and Lack of diversity	3/29/2022 5:29 PM
17	Invasive weeds and lack of production	3/29/2022 4:20 PM
18	Legumes disappearing. "June grass" and weeds begin to spread.	3/29/2022 3:39 PM
19	When it isn't yielding nearly what a new seeding would, or if the field is too rough and needs to be reworked	3/29/2022 12:33 PM
20	Weeds, alfalfa loss, sod bound.	3/29/2022 10:31 AM
21	When the yield reaches 50%	3/29/2022 9:55 AM
22	when we have lost too much of the alfalfa in the stand usually due to freezing out in winter . ice in fields	3/28/2022 8:06 PM
23	I add manure annually. I use chemical fertilizer when alsike clover is abundant	3/26/2022 1:06 PM
24	When the stand has petered out and become sod bond	3/25/2022 9:46 PM
25	Sadly, it has to be when I have the time and energy.	3/25/2022 6:47 PM
26	Decreasing production	3/25/2022 5:05 PM
27	As above	3/25/2022 2:01 PM

28	when production falls off due to age or natural loss	3/25/2022 11:40 AM
29	No regeneration.winter kill	3/25/2022 8:38 AM
30	When it starts thinning out	3/25/2022 8:06 AM
31	On the hay land if the stand is thinning out and/or not producing enough to cover input costs (1.5-2 tons / ac) then it's time to consider rotating the crop. On pasture land I Would like to be able to graze 2ac per cow/calf pair for a minimum of 90 days.	3/24/2022 5:15 PM
32	Rejuvenation, for me, needs to happen when the crop starts to show areas where it is struggling to grow, either from poor soil, winter kill, or noxious weed colonies. Also if an area has lost crop diversity.	3/24/2022 2:57 PM
33	Yield and stand purity	3/24/2022 9:18 AM
34	poor yield	3/23/2022 6:17 PM
35	We aim to continuously rejuvenate our stands using regenerative agriculture practices, focusing on cattle impact and cover crops.	3/23/2022 6:01 PM
36	yield drops below 2 ton per acre	3/23/2022 4:47 PM
37	when the alfalfa in a stand is not as productive, plants are fewer and less robust	3/23/2022 9:12 AM
38	Lack of production	3/21/2022 2:51 PM
39	when tame hay land production drops below 1.25 T/ac then becomes pasture land until production falls below 75cow days /ac, then time to renew forage stand	3/17/2022 10:42 PM
40	want more diversity	3/16/2022 8:23 PM
41	Decrease forage yield and quality	3/16/2022 1:15 PM
42	the volume and quality of the feed	3/15/2022 9:58 AM
43	I don't any yields of grass or I have over grazed the pasture	3/13/2022 11:12 PM
44	Yield and invasive plants	3/13/2022 10:04 PM
45	increased amount of invasive weeds, decrease in production.	3/13/2022 2:37 PM
46	When the yield declines and invasive plants or wire grass take over.	3/12/2022 9:33 PM
47	I like to keep production above 2tons /acre. Some fields are more productive than others so I take that into consideration	3/12/2022 10:44 AM
48	Yield due to winterkill	3/11/2022 10:22 PM
49	When production drops below 1.5 tons of hay per acre taking into account spring/early summer moisture and winter snow pack prior to harvesting.	3/11/2022 7:42 PM
50	When production drops to about two tons per acre or when grasses take over about 50% of the volume in an alfalfa stand.	3/11/2022 2:19 PM
51	When it drops to 70% of it's highest production years. Anything below that it costs money. fertilizing below 70% crop cost the same as 90 to 100% crop.	3/11/2022 12:45 PM
52	The amount of winter kill, % of alfalfa stand left.	3/11/2022 12:38 PM
53	Poor production, winter kill, poor establishment at seeding	3/11/2022 12:32 PM
54	plant species composition and production	3/11/2022 12:14 PM
55	Invasive weeds, Yield, Loss of preferred species in stand.	3/10/2022 12:55 PM

### Q13 When establishing a new forage stand, what is your primary source of information to determine which varieties to include in your mix?

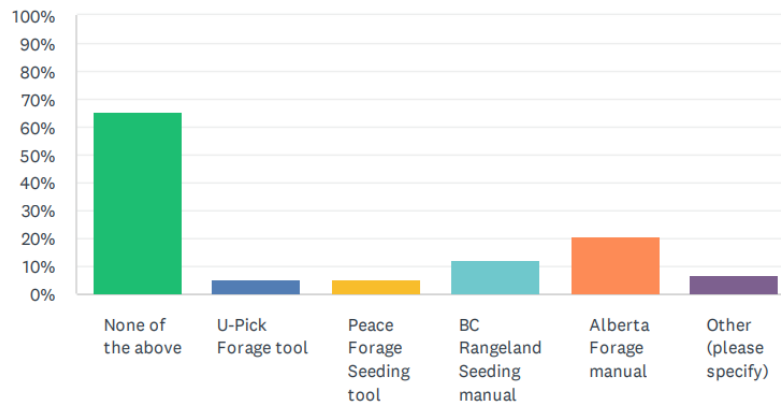
Answered: 58 Skipped: 0



#	OTHER (PLEASE SPECIFY)	DATE
1	a little of all of the above	3/31/2022 9:56 AM

### Q14 Have you used any of the following tools to support your forage variety selection?

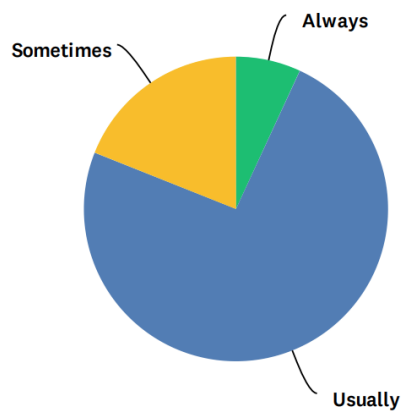
Answered: 58 Skipped: 0



#	OTHER (PLEASE SPECIFY)	DATE
1	information from my own seed trial. Talking to seed reps and other farmers	4/4/2022 12:07 PM
2	we did not know of the existence of the tools above... so we will check them out	3/30/2022 4:01 PM
3	Four periodicals that come in email or print.	3/29/2022 3:39 PM
4	Green cover crops	3/23/2022 6:01 PM

Q15 Based on your experience with forage rejuvenation, how often would you rate your forage stand establishment as successful?

Answered: 58 Skipped: 0





## Q16 Please describe the most common issues you encounter during forage rejuvenation in more detail.

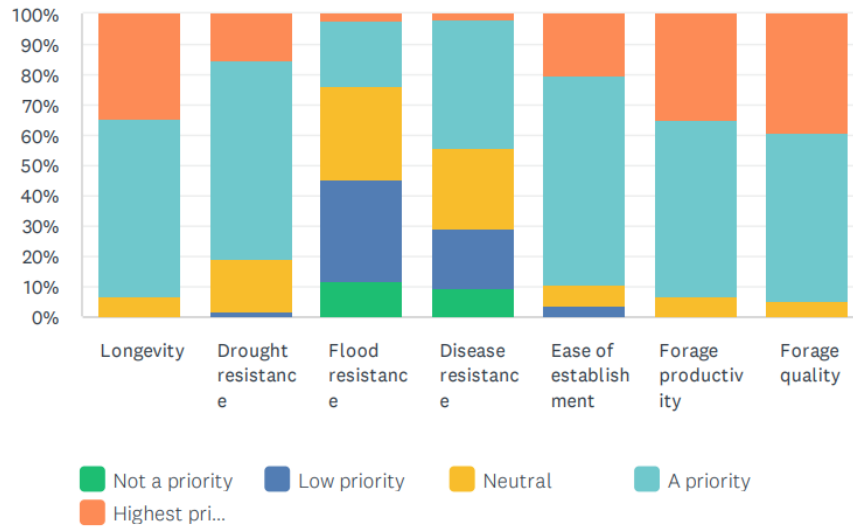
Answered: 54 Skipped: 4

#	RESPONSES	DATE
1	only option that works is to completely kill and reseed the stand	4/12/2022 9:37 AM
2	cutworm and grasshopper infestation	4/4/2022 12:07 PM
3	hard to find regional information about different practices of rejuvenating land into forage production and their success rates and challenges	4/1/2022 10:02 PM
4	Lack of moisture	4/1/2022 8:08 PM
5	getting seed in the ground early enough to take advantage of spring moisture	4/1/2022 7:03 AM
6	Slow to establish perennial grasses. Yields are not up to par with other regions. 3rd year before the grass is highly productive	3/31/2022 4:53 PM
7	minimal organics	3/31/2022 9:56 AM
8	winter kill	3/30/2022 7:18 PM
9	high costs, lots of rocks to pick, zero till not very successful for us, sporadic establishment results rom year to year without really conclusive reasons or those sporadic results	3/30/2022 4:01 PM
10	soil fertility is our biggest limiting factor in rejuvenation success.	3/30/2022 2:35 PM
11	successful establishment	3/30/2022 10:17 AM
12	Without the use of chemicals to terminate a perennial stand prior to no till seeding, how to stress the perennial stand sufficiently to provide the oportunity for new seed establishment before the existing stand out competes it.	3/29/2022 8:29 PM
13	Cannot establish alfalfa stand, and lack of moisture following seeding allows lambs quarters to form a thick mat and choke out newly seeded forage stand.	3/29/2022 6:18 PM
14	Only done it once. On borrowed equipment with no experience. Lack of knowledge and lack of equipment. Oversized hobby farm so not taken seriously when asking and purchasing products. Unable to justify cost vs need for equipment to rejuvenate 10 acres when every ditch and right of way is full of invasive weeds. Working full time and farming makes it hard to hit the weather right sometimes.	3/29/2022 4:20 PM
15	Trying to reseed without using Round-up.	3/29/2022 3:39 PM
16	Our tillage equipment lineup isn't quite what it should be, which makes establishing a good smooth seedbed a challenge	3/29/2022 12:33 PM
17	Weather	3/29/2022 10:31 AM
18	Getting the moisture after seeding	3/29/2022 9:55 AM
19	major factor for us is the weather, if we can get on field to get it seeded by end of May and if we get may/ june showers, usually our stand is good. if we do get timely rain showers our drier fields have seedlings that drought out	3/28/2022 8:06 PM
20	Not enough.composted manure	3/26/2022 1:06 PM
21	Getting a 100% germination	3/25/2022 9:46 PM
22	Time and equipment limitations, ie, I would love to turn under some invasive plant and reseed on top, but my equipment for breaking the soil isn't working and is expensive to fix.	3/25/2022 6:47 PM
23	Wet condition at Spring seeding. Dry conditions in August.	3/25/2022 5:05 PM

24	Winter kill	3/25/2022 2:01 PM
25	freeze damage and cost of fertilizer	3/25/2022 11:40 AM
26	Weather soil prep	3/25/2022 8:38 AM
27	Getting a good catch	3/25/2022 8:06 AM
28	Wildlife damage caused by elk	3/25/2022 7:34 AM
29	One issue that has become more common in the last five years or so is the periodic infestations of grasshoppers. If it happens to be a bad year for them they seem to hatch at the time of seed germination and they can wipe out fairly large areas of new crops. Another main issue is the length of time it takes for a new crop to establish. There is rarely anything to harvest in the seeding year and it often seems the second year doesn't produce to its full potential.	3/24/2022 5:15 PM
30	Weather is my biggest problem. The spring and fall have been cool and wet the last couple of years which hampers my efforts to get out on the land with equipment at the appropriate times. Also, I'm trying to move away from chemical fertilizer and tillage, while trying to build soil and there isn't really a lot of information that I've found that relates to our climate as far as helpful plant species, etc. That has led me to experiment, which I don't mind doing at all, but if there were some resources available relating to our area it would give a person a starting point.	3/24/2022 2:57 PM
31	Seedling mortality and pest/weed pressure	3/24/2022 9:18 AM
32	Either too dry or too wet after seeding	3/23/2022 6:32 PM
33	poor moisture	3/23/2022 6:17 PM
34	Fighting soil compaction, as well as neighbours cattle	3/23/2022 6:01 PM
35	drought and cut worms	3/23/2022 4:47 PM
36	getting the proper soil preparation for good seed to soil contact, too easy to over till	3/23/2022 9:12 AM
37	Dry clay soil	3/21/2022 2:51 PM
38	invasive plants, drought, cold ground	3/17/2022 10:42 PM
39	soil condition	3/16/2022 8:23 PM
40	Weather Events, Pests	3/16/2022 1:15 PM
41	drought and some time not the best seed bed prep.	3/15/2022 9:58 AM
42	The limited to equipment to do the process and funding	3/13/2022 11:12 PM
43	Poor kill on previous crop and weeds	3/13/2022 10:04 PM
44	Dry weather after planting. Sod not completely broken down prior to seeding	3/13/2022 2:37 PM
45	Lack of moisture in new seeding.	3/12/2022 9:33 PM
46	Pests, mostly grasshoppers and lack of moisture	3/12/2022 10:44 AM
47	Dry conditions, grasshoppers	3/11/2022 10:22 PM
48	Rainfall at appropriate times after or before planting	3/11/2022 7:42 PM
49	It is usually inclement weather	3/11/2022 4:21 PM
50	Elk trampling during establishment, and pawing during the winter. 90% of elk damage comes from pawing and killing the alfalfa during the winter. Once elk paw in a field they will return every winter.	3/11/2022 2:19 PM
51	Timing. Hitting the weather right. Soil temp needs to be warm enough yet still need to catch the cooler wet spring weather for maximum germination. That doesn't always happen.	3/11/2022 12:45 PM
52	Elk are a major issue with our forage crops.	3/11/2022 12:38 PM
53	Lack of appropriate moisture after seeding, seed purchased from co-op (before purchasing Glen Dale) did not take	3/11/2022 12:32 PM
54	high cost of rejuvenation and pest damage	3/11/2022 12:14 PM

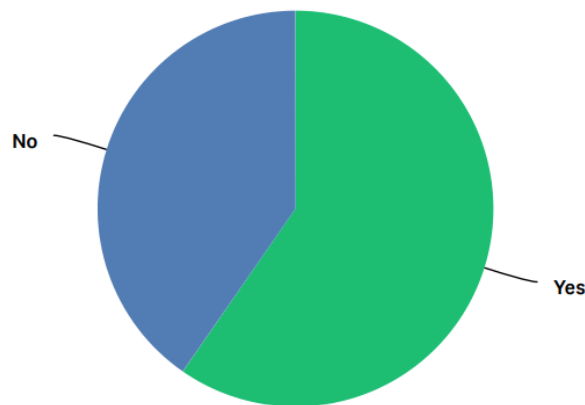
### Q17 For future forage crop and variety selection, how would you rank the following traits?

Answered: 58 Skipped: 0



### Q18 In the past five years, have you introduced any new forage species or varieties on your operation?

Answered: 57 Skipped: 1



## Q19 What was the name of the new forage species or variety?

Answered: 38 Skipped: 20

#	RESPONSES	DATE
1	Alfalfas : top hand, stealth, performer, stronghold, 4440, 4020, rugged, th2, lelia, ac meadowview, response, robust	4/6/2022 8:49 AM
2	Sainfoin, birdsfoot Trefoil, hairy vetch	4/1/2022 10:03 PM
3	Trying different alfalfa blends	4/1/2022 8:08 PM
4	we have tried some mixed annuals-radish, turnip, kale, cereal in rotation with perennial forage stand	4/1/2022 7:03 AM
5	yellow sweet clover, sainfoin, birdsfoot trefoil	3/31/2022 4:53 PM
6	timothy, red clover, pink clover, orchard grass	3/30/2022 9:00 PM
7	brassiccas, hybrid brome, sainfoin, trefoil, peas, different varieties of alfalfa	3/30/2022 4:02 PM
8	sorghum sudan, buckwheat, phacelia, plantain, chicory, sunflower...the list is very long and constantly evolving	3/30/2022 2:35 PM
9	sainfoin, trefoil, brassicas	3/30/2022 10:17 AM
10	Birdsfoot trefoil	3/29/2022 8:30 PM
11	Birdsfoot trefoil, response wt alfalfa, sandfoin, turnips, forage rape, hairy vetch, crimson clover, annual ryegrass.	3/29/2022 6:18 PM
12	Turnip	3/29/2022 5:30 PM
13	Frosty Berseem clover; Bruce bird's-foot trefoil	3/29/2022 3:39 PM
14	Birdsfoot trefoil	3/29/2022 10:32 AM
15	tall fescue	3/28/2022 8:06 PM
16	N/A	3/25/2022 9:46 PM
17	alfalfa Peace	3/25/2022 11:40 AM
18	Turnip	3/25/2022 7:41 AM
19	Turnips and brassicas in an annual crop.	3/24/2022 5:17 PM
20	n/a	3/24/2022 2:57 PM
21	Vision Alfalfa, Tiffany Timothy	3/24/2022 9:18 AM
22	Too numerous to list	3/23/2022 6:02 PM
23	kale turnip and radish for pasture	3/23/2022 4:48 PM
24	crested wheatgrass	3/23/2022 9:13 AM
25	sanfoin	3/17/2022 10:42 PM
26	sainfoin brassicas radishes	3/16/2022 8:23 PM
27	Peace Alfalfa, Alma Timothy	3/16/2022 1:15 PM
28	festulolium, turnups, peas.	3/15/2022 9:58 AM
29	birdsfoot trefoil	3/13/2022 2:49 PM
30	Lila alfalfa	3/12/2022 9:33 PM

31	Lelia alfalfa and Rambler alfalfa	3/12/2022 11:11 AM
32	Cicer milk vetch	3/11/2022 4:21 PM
33	Vaelvet 11, stronghold, 4440, 4030, 4020, Leila Alfalfa. Crown Royal Orchard grass.	3/11/2022 2:20 PM
34	This is a comment for question 17. I think winter hardiness should be a trait. I know that is very important to me.	3/11/2022 12:45 PM
35	Instinct Alfalfa	3/11/2022 12:38 PM
36	Sainfoin	3/11/2022 12:32 PM
37	sweet clover, turnip, forage brassica, fall rye	3/11/2022 12:14 PM
38	Vision Alfalfa, Tiffany Timothy	3/10/2022 12:56 PM

## Q20 Is there a new dryland forage species or variety you are considering adding within your operation?

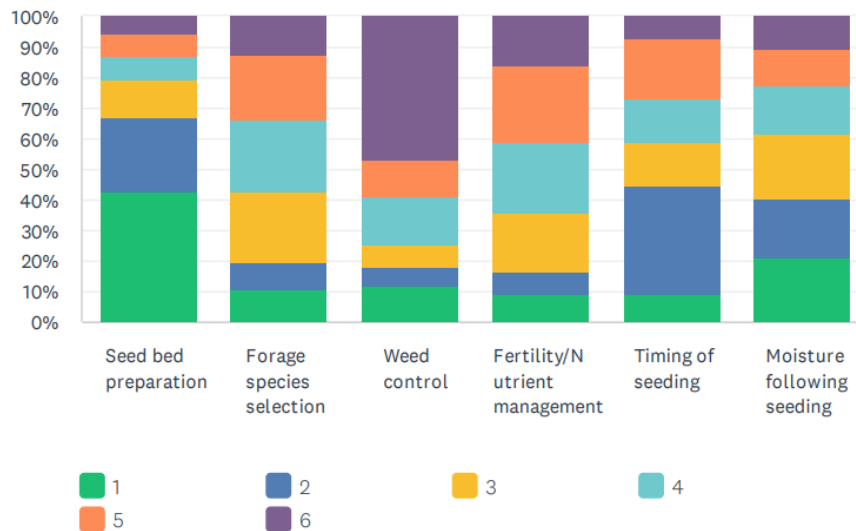
Answered: 45 Skipped: 13

#	RESPONSES	DATE
1	no	4/12/2022 9:37 AM
2	yellow flowered alfalfa	4/6/2022 8:49 AM
3	No	4/5/2022 7:00 AM
4	clover	4/1/2022 10:03 PM
5	Not yet but checking it out.	4/1/2022 8:09 PM
6	no	4/1/2022 7:03 AM
7	always open to trying something new	3/31/2022 4:53 PM
8	turnips	3/31/2022 9:57 AM
9	birdsfoot trefoil or sanfoin	3/30/2022 9:00 PM
10	don't know	3/30/2022 7:18 PM
11	we always reserve a few acres or experimentation	3/30/2022 4:02 PM
12	yes	3/30/2022 2:35 PM
13	looking for new options	3/30/2022 10:17 AM
14	N/A	3/29/2022 8:30 PM
15	Sorghum x Sudan grass, sunflowers.	3/29/2022 6:18 PM
16	perhaps meadow brome	3/29/2022 3:39 PM
17	At this time no	3/29/2022 12:33 PM
18	Tall fesque	3/29/2022 9:55 AM
19	Teff. But doesn't grow here. Low sugar.grasses most important	3/26/2022 1:06 PM
20	undecided	3/25/2022 9:47 PM
21	no	3/25/2022 5:05 PM
22	No	3/25/2022 2:01 PM
23	no	3/25/2022 11:40 AM
24	Not at this point in time checking	3/25/2022 8:38 AM
25	Not sure	3/25/2022 8:06 AM
26	No	3/25/2022 7:41 AM
27	Not at this time.	3/24/2022 5:17 PM
28	I'd like to experiment with light top seeding of annual legumes and cereals to help fix nitrogen and build biomass in the soil from their decomposing root systems. I'd be interested to find some annuals or perennials with root systems capable of penetrating into clay as well.	3/24/2022 2:58 PM
29	No	3/24/2022 9:18 AM
30	Triticale, Faba Beans	3/23/2022 6:02 PM

31	no	3/23/2022 4:48 PM
32	Not yet	3/21/2022 2:51 PM
33	crimson clover	3/16/2022 8:23 PM
34	i wood be interested in trying different varieties for cover cropping and perennial forage	3/15/2022 9:58 AM
35	Peas	3/13/2022 11:12 PM
36	no	3/13/2022 10:04 PM
37	No	3/12/2022 11:11 AM
38	Tall fescue	3/11/2022 10:23 PM
39	Sainfoin	3/11/2022 4:21 PM
40	Not presently, but I would add new alfalfa varieties based on longevity, rather than the amount of seed produced per acre. We sell hay, not seed and short lived varieties that produce a high amount if seed, but produce a small amount of forage and winter kill or die out easily are only good for seed growers.	3/11/2022 2:20 PM
41	Not at this time. If it ain't broke don't fix it.	3/11/2022 12:46 PM
42	Not at this time.	3/11/2022 12:38 PM
43	No	3/11/2022 12:32 PM
44	hybrid brome	3/11/2022 12:14 PM
45	No	3/10/2022 12:56 PM

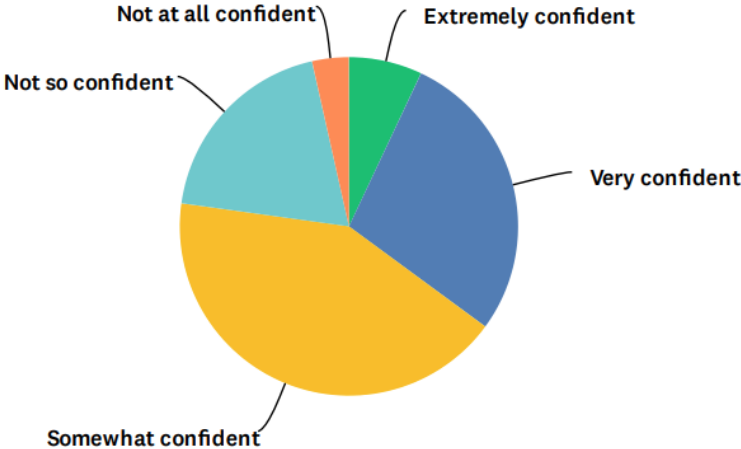
**Q21** In your own experience, what are the key ingredients to successful forage stand establishment? Please rank the following from most important (1) to least important (6).

Answered: 58 Skipped: 0



# Q22 How comfortable are you in conducting your own on-farm forage variety trials?

Answered: 57 Skipped: 1





## Q23 If you had a magic wand, what tool(s) would you create to support you in selecting the best forage species and varieties for your region?

Answered: 48 Skipped: 10

#	RESPONSES	DATE
1	cheap fertilizer	4/12/2022 9:37 AM
2	Able to visit farms trying different varieties	4/6/2022 8:49 AM
3	a resource that shows the trails of forage varieties tried in our local area and the results with testimonials from local producers	4/1/2022 10:03 PM
4	Rain when the plants need it. Not a little shower but a soft soaking rain..	4/1/2022 8:09 PM
5	maybe a little more information based on locally produced results	4/1/2022 7:03 AM
6	Published local trials	3/31/2022 4:53 PM
7	good regional site specific information	3/31/2022 9:57 AM
8	I don't understand the question	3/30/2022 9:00 PM
9	We'd like to familiarize ourselves with the tools that exist and improve on one of them	3/30/2022 4:02 PM
10	A system or organisation that facilitate seed procurement.	3/30/2022 2:35 PM
11	improve one of the existing tools to be more region specific using producer input	3/30/2022 10:17 AM
12	Unknown	3/29/2022 8:30 PM
13	Some way of sharing knowledge between progressive producers.	3/29/2022 6:18 PM
14	A time machine so I could fast forward and see long term effects of my small scale experiments	3/29/2022 5:30 PM
15	Don't know enough to answer	3/29/2022 4:20 PM
16	On-ground agronomists.	3/29/2022 3:39 PM
17	Don't really need any special tools, just need to tease arch to the best of my ability, and take a chance with the best option I can find	3/29/2022 12:33 PM
18	test plots	3/28/2022 8:06 PM
19	A server for top seeding I saw on tom Pemberton. A way to spray liquid manure	3/26/2022 1:06 PM
20	not sure	3/25/2022 9:47 PM
21	An interactive map, of the province showing the success of varieties around the province and information on each variety in the map.	3/25/2022 6:47 PM
22	B.C.	3/25/2022 2:01 PM
23	variety trials	3/25/2022 11:40 AM
24	Cost	3/25/2022 8:38 AM
25	Local knowledge advisor	3/25/2022 7:41 AM
26	I'm not sure of any specific tools. There does seem to be a growing number of annual blends and varieties of plants that are available in Alberta and the Peace areas. It would be nice if there were some trials done in this area to determine which would have the most potential benefit.	3/24/2022 5:17 PM
27	A regional database with information on tried and tested varieties. Also data on how well varieties do together, soil type, precipitation and other weather data, as well as data on other	3/24/2022 2:58 PM

factors that might contribute to the success of the test plot that the information came from.

28	Regional relevant data	3/24/2022 9:18 AM
29	Actual forage trials done in my community not other communities	3/23/2022 6:32 PM
30	British Columbia	3/23/2022 6:17 PM
31	Actual seed trial data from our area	3/23/2022 6:02 PM
32	forage trials	3/23/2022 4:48 PM
33	time machine	3/23/2022 9:13 AM
34	a tool to warm the earth	3/17/2022 10:42 PM
35	on farm trails	3/16/2022 8:23 PM
36	a resource base will local knowledge of best species for this area	3/15/2022 9:58 AM
37	Talking to a soul consultant- having enough time implement	3/13/2022 11:12 PM
38	a well managed plot of trials of pertinent forage varieties that would be ongoing year to year.	3/13/2022 10:04 PM
39	Return to experimental farms with various varieties grown under various conditions to allow for visual comparisons of forages	3/13/2022 2:49 PM
40	Literature	3/12/2022 9:33 PM
41	Long term studies to determine longevity	3/12/2022 11:11 AM
42	Don't know	3/11/2022 7:42 PM
43	Seed that could survive drought after emergence.	3/11/2022 2:20 PM
44	If I had a magic wand I wouldn't be farming:)	3/11/2022 12:46 PM
45	Price	3/11/2022 12:38 PM
46	An accurate weather predictor	3/11/2022 12:32 PM
47	more field scale variety testing	3/11/2022 12:14 PM
48	Access to region specific long term trials	3/10/2022 12:56 PM

## Q24 Do you have any other comments, questions, or concerns?

Answered: 22 Skipped: 36

#	RESPONSES	DATE
1	no	4/12/2022 9:37 AM
2	availability of fertilizer at a reasonable price in the future	4/6/2022 8:49 AM
3	Keeping my eyes and ears open as to whats happening.	4/1/2022 8:09 PM
4	We need real Current data from our regions. Like the old Smithers Experimental Farm used to do. Doing personal on farm trials is subjective and difficult to quantify/compare in a meaningful way. Need better support from Government to conduct trial and compare data. second to Water shortage our region has a major nutrient deficiency. with ever increasing costs how do we know how much and what fertilizer is the best benefit	3/31/2022 4:53 PM
5	there are so many variables other than species or variety selection that determine a successful stand. To have a better way to share and assess each others choices and practices would be so helpful.... a tool such as a forum or sharing that kind of info? trouble is, most larger scale or commercial farmers would likely not participate and that is where the reliable information is currently being stored!	3/30/2022 4:02 PM
6	Thank you for the oportunity for input	3/29/2022 8:30 PM
7	Why no questions related to till vs no till field prep and seeding or use of nurse crops	3/29/2022 10:32 AM
8	would like to see biological options for weed control instead of chemical spray if possible. free forage testing,	3/28/2022 8:06 PM
9	Please stop telling farmers to plant orchard grass. My horses won't eat it unless desperate. Find low sugar grasses for hay	3/26/2022 1:06 PM
10	High cost of fertilizer, in time will create food shortages	3/25/2022 11:40 AM
11	No	3/25/2022 7:41 AM
12	Not at this time.	3/24/2022 5:17 PM
13	I notice that there isn't really any emphasis or even mention of soil health in the survey. To me, you can't have any kind of success growing things long term without considering the health of the soil, so it would be nice to see some resources related to that as well.	3/24/2022 2:58 PM
14	no	3/23/2022 4:48 PM
15	we need more research regarding no till options for establishing forage crops	3/23/2022 9:13 AM
16	No	3/21/2022 2:51 PM
17	have to learn to do without tilling	3/16/2022 8:23 PM
18	No till trials, ie. seeding into sod, would be a huge advantage. Any trials to control weeds would be beneficial.	3/13/2022 10:04 PM
19	Experience has shown that coated seed has no advantage in clay type soil, and in fact is an added cost on clay type soils. Coated seed may be advantages in sand type soil or on poorly prepared soil where the seed bed is not firm enough and the field is not properly packed after seeding.	3/11/2022 2:20 PM
20	The last 4 years fertilizing in row with the seed has transformed the success rate immensely. Putting the product where the seed is and incorporated into the soil is a must. If I don't get the moisture right away the fertilizer doesn't dry up and blow away or evaporate.	3/11/2022 12:46 PM
21	No	3/11/2022 12:32 PM
22	No	3/10/2022 12:56 PM

## Appendix B – Seed Dealer and Agronomist Survey Results

The forage **grass species** most purchased included:

- Brome grasses,
- Timothy, and
- Orchardgrass.

Secondary grass species included tall fescue, crested wheatgrass, and perennial ryegrass.

The most common **forage legumes** included:

- Alfalfa,
- Red clover, and
- Alsike clover.

Within the forage legumes, alfalfa is the most commonly selected. Varieties used are numerous although Peace alfalfa is in high demand. Producers also preferred alfalfa blends containing multiple varieties with different root (tap and branched) and growth (tri- and multi-foliolate) characteristics. These blends can help increase the chances of successful plant establishment and persistence across fields with significant soil and moisture variability. Alfalfa winterkill was mentioned as a concern. Some of the suspected reasons included species selection problems or misguided recommendations from seed dealers, such as choosing alfalfa with higher fall production (i.e., low fall dormancy) leading to greater likelihood of winterkill.

When producers approach a seed agronomist, they generally do not yet have a mixture formulated and are seeking input on what forage species or varieties to grow. The seed agronomist often provides a good amount of education around species selection and blending recommendations. Respondents underlined the importance of differences among species but also variability within a species based on different genetics as well as the ecoregion where the seed is sourced from. In contrast, producers approaching the Co-op, are generally expected to either already know their custom blend or simply pick a pre-mixed blend. Most producers opt for **pre-mixed blends**, which may limit the variability in choices that growers make. For example, the Four Rivers Co-op offers three main blends, a pasture mix (alfalfa, orchard grass, timothy, crested wheatgrass, and perennial ryegrass), a grass pasture mix (orchard grass, timothy, crested wheatgrass, perennial ryegrass), and a straight grass blend (brome and orchard grass). Other dealers commented that they came up with their own region-specific blends (outside of the dealer specific pre-mix blends) to account for regional differences. Some respondents expressed concerns about pre-mixed blends and the lack of regional specificity.

**Custom blends** are more commonly requested by larger or well-established producers, particularly dairy producers. The custom blend may stem from experience or consultation with an agronomist. These are generally also the producers more open to trying new varieties or forage crops. For dairy producers, the production of butter fat is an important consideration, increasing their willingness to invest in higher inputs for high quality forage. Custom blends are available with a general minimum order of one 55-pound seed bag, which should allow even smaller operations to access custom blend options, if desired.

From the respondent's perspective, the following **forage selection and management tools** are most helpful to producers:

- Species/variety adaptation information based on region and climate.
- Soil nutrition information provided through soil testing.
- Seeding rate, which often starts a big discussion.
- Needing more custom fit tools based on regional requirements and tailored to producers.

A follow up question asked if respondents refer their clients to any **support tools** or if there were any tools they would like to see available for producers. Some tools that respondents have referred their client to include:

- Alberta Forage Manual.
- An app to calculate nutrient removal rates.
- Webinars or seminars.
- Weather apps.

One respondent noted that even though it is helpful to have tools, they cannot stand alone. Although a tool can be a good start for some producers, more extension and hands-on knowledge is still needed. Producers generally do not trust what they have not seen first-hand.

Forage goals depend on the farm business type. Dairy producers may lean more towards short rotation, annual forage crops, high yield, and quality. Beef producers are mostly looking for stand longevity, fall grazing options, and decent productivity. Goals of commercial hay producers will vary depending on the end-user in mind, for example horse hay versus dairy hay. For horse pastures, selection usually narrows to smooth brome, orchard grass and timothy with the goal of maintaining ground cover under continued close grazing. Overall, the number one characteristic forage growers are looking for is stand **longevity**. A stand life of 10 years or longer is commonly requested. One respondent was hopeful that stand rotations may shorten when the economic and ecological benefits of shorter rotations can be demonstrated to producers. Most producers are also focused on price and will make price-based choices among varieties. Besides longevity and budget considerations, yield is also of interest to the forage growers.

A general **lack of interest in experimenting** and trying new varieties was commented on a couple of times. Respondents estimated that between 10-25% of clients are interested and willing to try something new or outside of the common choices. Larger operations appear more open to testing new varieties or new forage crops.

When asked if respondents notice any sub-regional differences within the BNFFG area, they commented on regional changes in soil properties such as nutrient levels, precipitation, and number of frost-free days. One respondent also noted the change in type of producer with the number of dairy producers increasing when moving westward.

Local, **region-specific trials are limited or lacking**. Variety information is generally pulled from other areas with some assumption that variety performance can be approximated when comparing it to observations from the Cariboo, southern BC interior, or the Peace region. Lack of funding and staff resources was listed as the number one reason for lack of regional forage variety trials. When compared to other forage growing regions within Canada, the BNFFG area is also too small with not enough demand to exert leverage on large forage seed companies to entice more region-specific information. Forage crop variety registration no longer requires recommending committees, which has also greatly reduced the number of trials conducted even outside of the BNFFG area. Seed representatives often conduct semi-formal trials close to their home base. Hence if seed

representatives are not located within the BNFFG area there are also fewer company led, local trials conducted.

Respondents were generally surprised about the continued high demand for older alfalfa varieties such as Peace and Algonquin alfalfa. There was also surprise that some producers would choose alfalfa varieties with fall dormancy of four or even five. Lower fall dormancy ratings would be a safer approach to reducing the risk of winterkill.

Some of the forage species and varieties that respondents were **surprised that they are not used more often** in the BNFFG area included:

- Soft-leaved tall fescue varieties - tall fescue used to get a bad rap on palatability.
- Tall fescue as a replacement for orchard grass where winter survival is an issue.
- Meadow fescue in areas with high moisture - although seed availability is limited.
- Hybrid brome – should work well as a dual-purpose grass species.
- Alaska brome - a new variety from New Zealand with potential although seed availability is limited and existing seed lots have downy brome contamination.
- Intermediate wheatgrass – large seed and high seed cost makes it prohibitive.

All respondents commented that they provide a significant amount of **agronomic support** to forage seed clients, including discussions on seeding depth, timing, fertility, pre-seed weed control, seedbed prep and more. The largest knowledge gap observed among forage producers was soil fertility, micronutrients and the '4Rs' of nutrient management. One respondent indicated that he is expecting real challenges down the road because clients do not know enough about fertility. Some agronomic support focuses on pest management, including pea leaf weevil, alfalfa weevil, armyworm, and verticillium wilt. **Verticillium wilt** and other root rots are likely more prevalent than the current surveys indicate and may become a more significant problem in the future.

There is a decent amount of feedback on success and failure stories that make their way back to the respondents from their clients. Some do active follow up with their clients, while some also encourage on-farm record keeping to gain better knowledge of what works on each operation. Most common forage crop failures centred around establishment issues: seeding too deep, seedbed too loose, or using a power harrow prior to dry weather also causing a much too loose seedbed. Secondary forage establishment failure focused on timing for fall seeding and not providing good enough plant establishment to ensure winter survival.

New **varieties of interest** to seed companies and general breeding advances under way, include:

- New higher yielding alfalfas
- Gene mapping in alfalfa which may speed up breeding and might lead to quicker commercialization.
- Silage or grazing corn.
- Low heat unit corn varieties.
- Festulolium forage grass (especially for dairies), although lack of winterhardiness, and slow dry-down in some of the varieties may be challenging.
- Orchard grass and fescue – ongoing development.
- Sainfoin.
- Red clovers – single and double cut, low pH tolerance varieties.
- Lots of development in oats and forage barley.
- Interest in cover crops.

The following forage varieties have **sold well** in the BNFFG regions:

- Peace alfalfa;
- DLF Pickseed's Instinct Alfalfa;
- Brett Young 4440 alfalfa blend;
- Alma, Climax, and common timothy;
- Catapult orchard grass;
- Field peas grown with oats and barley.

The following forage varieties have **not seen widespread use** in the BNFFG region:

- Perennial ryegrass – needs to be managed intensively, best under irrigation and with nitrogen applications;
- Cicer milkvetch – seed cost and availability have limited its use;
- Birdsfoot trefoil – although use is increasing;
- Hybrid brome grass.

Additional notes, comments and **observations** shared by the seed company/seed agronomy survey respondents:

- Economics seen as the biggest issue with forages;
- Helping producer understand that there is value in having productive stands;
- What are the impacts going to be if I don't use any inputs;
- Observing a cost cutting mentality, when something gets more expensive and fertility is usually first place to look to cut corners;
- Finding that many producers have a pessimistic approach to farming;
- Notion of going as low cost as possible doesn't always work: spend money in right places and producer will have more money left over at the end;
- Verticillium wilt is a concern that should be more addressed;
- Observed sales rep selling the wrong product or making strange recommendations;;
- Significant discrepancies around seeding rates and some maybe too high or too low. For example: orchardgrass and fescue mix would be seeded at 8-9 lbs per acre in the prairies but at over 20 lbs per acre in BC, in some cases as high as 30 lbs per acre;
- Mismanagement of forage stands was mentioned a couple of times;
- Concerns over constant nutrient removal without adding anything back;
- Soil pH levels are becoming limiting to some key forages like alfalfa;
- Applying the wrong combination of fertilizers can leave producer low on cash flow without producing desired yield and stand improvements;
- Agronomy needs a shift; at the moment trying to squeeze more out of nothing without covering bases of soil fertility;
- Climatic challenges: low awareness, many producers don't want to talk about it;
- Wildlife issues, looking for species the deer won't eat.

Suggestions for **solutions** and further work brought forward by respondents:

- Need to start with education; sometimes may have to proof education with on-farm trials; used to have replicated trials along Hwy 16 – were only for 3 years – but that is not the live of the farmer; need to have a couple of farmers who do their practices on their farm but need to follow them for 10years to actually observe what their management does on the soil;
- Some farmers may not have the time and just want the answer;

- Get visual, hands-on ways for farmers to see the results; field tours are needed;
- Local trials and local data is needed for farmers to relate;
- Disease resistance: has not been much of a focus in the interior, may need more education and knowledge sharing;
- Fertilizer trials – demonstrate different rates, also include micronutrients;
- Variety trials of some sort – do not need to be full blown;
- Seeding rate demonstration – anything around agronomy would help;
- Maybe a project on stand density/yield to get a scope on forage stand rotation practices – also make economic comparison – helping producers understand when it might not be worth it to keep a stand for extended periods;
- Seen some interest in extending forage stands with annuals, might be an interesting demonstration; adding orchard grass or an annual to extend a 2-3 year old stand when experiencing winterkill issues.



## Appendix C – Workshop Evaluations and Observations

### Feedback Survey Summary

(Summarized across all three locations)

**1. Please rate your level of satisfaction with the following:**

	Extremely Satisfied	Satisfied	Neither Satisfied nor Dissatisfied	Dissatisfied	Extremely Dissatisfied
Workshop topic & content	9	16	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presentations	11	14	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Workshop length	10	16	1	<input type="checkbox"/>	<input type="checkbox"/>
Venue	12	13	1	<input type="checkbox"/>	<input type="checkbox"/>

**2. The information presented was relevant to my needs.**

Disagree Strongly	Disagree Somewhat	Uncertain	Agree Somewhat	Agree Strongly
1	1	<input type="checkbox"/>	13	10

**3. The facilitators demonstrated a solid knowledge of the workshop content.**

Disagree Strongly	Disagree Somewhat	Uncertain	Agree Somewhat	Agree Strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4	21

**4. Overall, I am very satisfied with the workshop.**

Disagree Strongly	Disagree Somewhat	Uncertain	Agree Somewhat	Agree Strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10	15

**5. Which aspects of the workshop were most valuable? *Why?***

- Selecting the best seed blend for yourself and each field you have.
- Calculation and date results.
- I'm new to cattle business & everything discussed was helpful.
- Discussions about Bulkley valley specific successful species.
- Discussions with audience participation to presentation.
- How to share knowledge with each other & learn from producer experience.
- Forage U-Pick tool
- U-Pick tool. This could be a very helpful tool provided more input happens.
- Introduction to U-Pick forage selector.
- Pros & cons of varieties, research and U-pick forage tool

- In person was wonderful. Chances to have discussions & ask questions. Tool to support our region.
- Naming sources for information.
- Forage u-Pick tool. On farm forage trials
- Forage species & their strengths & weaknesses.
- The forage tool to decide which grasses to grow.
- How tolerant and winter hardy. On Farm forage trials.
- All aspects.

## **6. What projects/field demonstrations would you like to see in the future?**

- Building nutrition in the soil.
- Feed values on yield.
- Pasture mix.
- Soil sampling.
- Field size 5 acres or more trials of varieties, field treatment etc.
- Management practices key.
- Full size trials of new varieties & non-traditional forage varieties.
- Farm scale variety trials.
- Sludge /Ash
- More info on forages for challenging soil conditions.
- Late season grazing with annual cereal taken as haylage.
- Regenerative farming, top seeding, frost seeding, which grasses to use.
- Are weeds weeds? eg dandelions are very nutritious.
- Pasture care - moving or not to move.
- Compost, manure or ? for fertilizing rather than using chemicals.
- Dealing with unwanted plants like buttercup and alsike clover
- Water pH and herbicide

## **7. Additional comments?**

- More information on nutrients required for different crops.
- Including cultivation methods may be helpful.
- Could simplify slides as her experience illustrates the points.
- Too much irrelevant material in on-farm research presentation.
- Could benefit from microphone. Screen print small on some screens. Thank you for examples & illustrations.
- Awesome!
- Thank you for this opportunity!

## Workshop Observations & Notes

Prepared by Serena Black

- General lots of interest & engagement around alfalfa and winterkill, understanding the critical harvest period, and how to manage/select. Likely worth a written resource/factsheet.
- Winter hardiness measure – may be worth to find out if the rating is geographical based, or if there is a temperature associated to these ratings (how can we interpret them here?).
  - o Is there any specific information regarding alfalfa and clay soils? Smither's group: hypothesize that in clay soils, roots are not getting deep due to compaction (even the tap-rooted varieties), causing vulnerability, reduced longevity, and winter kill.
- There's a substantial range of the first killing frost. We heard this can range by 30 days, year-to-year, as well as throughout the region.
  - o Elk is a growing challenge, especially with alfalfa and new seedlings in general.
  - o One producer said they do a late cut of alfalfa (late Oct). Wait until after first killing frost, where root reserves have been put in so the plants won't try to regrow. Felt it was better than leaving regrowth that attracts elk, that paw/uproots the plants and kills a field.
- Shouldn't overlook alsike clover. It's a stable, that most people use with reliance.
- Still desperate for regional data on performance/establishment of cicer milkvetch and sainfoin. Some producers extremely confident/comfortable with birdsfoot trefoil.

### Feedback on draft Table of Species

- Include any information that we have regarding the forage quality of those species; time of maturity/physiological stages. When does it flower?
- For species that have substantial variety considerations (e.g., alfalfa), could there be a table outlining/comparing different varieties?
- Support around the idea to have additional comments section ("yes, if..., maybe, if... definitely not if...").
  - o Possibly include a blank space for them to add their own notes/experiences.
- If it's being established in an excel spreadsheet, could we create some conditional formatting, where people can select some of their data (soil info, etc.), and certain species are crossed out or highlighted as suitable?
  - o Perhaps too close to the U-Pick concept; not as useful?
- Seeding depth for different species; range of seeding rate(s) – or, perhaps more practical, weight of seed/lbs to get a sense of seed size.
- Potential yield – where we have local data (Highway 16 species trial).
  - o If going to look at regional yield data, can there be some initial assessment as to whether the sites where data was collected was representative of the region? Include some notes re: soil type, ag land class, etc.
- Price of seed
  - o It'd be outdated quickly. Put perhaps there's a blank column, and they could fill it out annually/adjust on their own.
- Seed availability – can they even get it?
- Nutrient management response – how responsive are the species to additional inputs?

### Resource/Fact sheet Notes

- Where did hybrid brome come from? Knowledge gap between the different species of brome, and their adaptability.
  - o Unrealized potential with hybrid brome; seems producers don't understand the differences.

- History of hybrid brome – a good idea for an article/communications piece
- The 7-step puzzle – could be a useful resource to put together, to help them with a process to work through. Could include additional links/resources associated with how to find information to answer those 7 pieces.
- Cicer milk vetch – hard to establish, several years before it comes in. Wasn't "common knowledge". Some areas where it "acts as an invasive" – so outlining conditions where it thrives, setting reasonable expectations, could be helpful.
  - Management/pairing: if you know it could take a while, might make sense to pair with a clover, or other shorter-lived species. Get that production in the first few years, then when it's dying out, might be seeing the cicer milkvetch coming in.
  - Needs scarification (not sainfoin – misinformation about sainfoin).

#### Other questions/notes

- Any information on foliar fertilizers? Interest in manure-compost tea spreading.
- Two people in PG were actively looking at RangeWorx – aeration and brush control.
- Lots of excitement over having the opportunity to share what they've been trying, and how it's worked. Looking for more chances to share informally.
  - Justin (Eaglet Lake area) – is trying corn.
  - Hixon – trying turnips and radishes this year.
  - Rossman (Quesnel) – have been adding sunflowers in with their oats, peas, barley.
- Survey results – Vanderhoof was surprised to see the species results. Locally, buying in bulk, and noticing different species being preferred – they felt there is less orchard grass going in, and more smooth brome grass being purchased.
- Links to share with participants in a follow up:
  - Forage U-Pick, SIFT, iMapBC, BC Manual, Alberta Manual.
- Presenting the survey provided an excellent environment to encourage discussion, sharing experiences amongst producers. They were keen to comment and discuss during the presentation showing them their own survey results.
- On the survey results – clarify "rejuvenate" (e.g., re-establish, vs. augment).
  - Inte-rseeding considerations, which may be suitable when not doing a "full rejuvenation."

#### Future programs/suggestions

- Establishing/organizing grazing clubs.
  - Just need folks to take notes and be quite diligent, then organize a pasture walk and share these results. Having some templates for data, support to coordinate, could go a long way in sharing ideas, and mentoring new/young entrants.
- Appreciates resources that provide specific examples of projects being done. Who is the farmer? How was the project set up? What did they do, and how did it work? Case studies with enough specifics to know how it could apply to their site.
  - Particularly lacking these types of materials from work completed in this region.
- We need a forum, hosted to get producers to share their information; what they do, what works, what doesn't
  - Similar to previous suggestions for BCFC membership from the directors.
  - Could be a worthwhile pilot to conduct in Smithers, and ensure we have resources to put in the time/energy to get it off the ground and engaged with by producers.
- Forage U-Pick
  - There was a lot of interest in the tool, and folks saying it would be something they could really benefit from, if there was a degree of confidence that it could be updated with region-specific data.

- Needs to have resources to keep the tool up to date; and differentiate between bio-geo-climatic conditions throughout the central interior.
- IDEA FOR PROGRAM
  - Get people to use the tool; go through it on their own, narrow their focus of what may be applicable.
  - Set up a follow-up workshop with agrologists with regional experience to dive into the details/results of their initial findings.
    - Could have local sources (seed stores) to inform varieties, availability, cost, etc., at the workshop to inform process.