Using a Novel Seed Mix to Rejuvenate Tame Pastures and Create Pollinator Habitat

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Introduction

- Pollinators are essential to our environment as the ecological service they provide is necessary for the reproduction of over 85% of the world's flowering plants[1].
- These essential pollinator services have been declining due to habitat loss, pesticide use and introduced diseases.
- Programs for restoring pollinator habitat in North America (e.g. General Mills/Cheerios and Xerces Society) often take place on or adjacent to pollinator dependent crops, where ground cover has been completely removed through a long history of tillage and/or spraying[2].
- In perennial pasture systems, flowering species will have to compete against vegetation left intact and alive. This is a significant challenge and there seems to be no information available to ensure success.

Objective

- To enhance species diversity and pollinator benefit of pasture while improving its value for grazing by planting a blend of tame and native legumes and forbs into existing pasture.

Methodology

- Three year project located at the Manitoba Beef and Forage Initiatives (MBFI) east of Brandon, MB on an existing 8.4 acre pasture with sandy soils dominated by smooth brome and Kentucky bluegrass with a latent population of alfalfa.

Plot Design

- Paddock was divided into three replicates (Figure 1), each treated with three suppression methods in spring 2019:

1. Chemical suppression – 1.05L/acre rate of Weathermax glyphosate on June 1, 2019
2. Grazing suppression – stock density of 106,000 lbs/ac (1.7 AUM/acre) grazed to a target of 80% utilization rate to reduce vegetation prior to drill seeding and after seed broadcast
3. No suppression – control

- Seed blend was provided by Xerces Society and AAFC (Table 1) and applied at a rate of 11 lb/acre using two methods on June 10, 2019. Half the plots were not seeded as a control.

1. Drill (DS) – after seed applied to plots, the tractor and empty drill drove over "no seed applied" plots so the all drill plots received the same disturbance.
2. Broadcast & Mob Graze (BMS) – after broadcast seeding, north half of paddock was grazed at stock density of 106,000 lbs/acre (1.3 AUM/acre) with the grazing suppression treatment blocks grazed a longer period of time than the other treatments to increase the forage utilization and obtain suppression impacts.

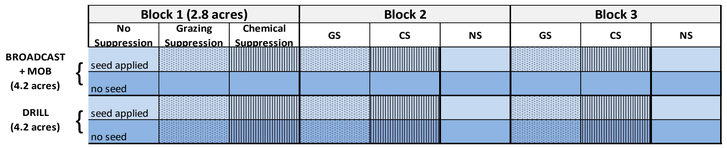


Figure 1. Project design

Data Collection

- Establishment and flowering stem counts were conducted August 21, 2019.
- Flowering stem counts were conducted July 29, 2020 and August 17, 2020.
- Forage samples were collected from grazing cages in block 3 only on July 15, 2020 dried and weighed prior to sending composite samples for quality analysis.
- Entire paddock grazed in early spring and late fall to 75% utilization in 2020.

Table 1. Species in seed blend by weight (%) and seeds/ft²

Species	Weight (%)	Seeds/ft²
Alfalfa	11.0	3.30
Clover, Alsike	8.0	2.40
Clover, Ladino	8.0	2.40
Sainfoin	8.0	2.40
Blazing Star	0.2	0.06
Heartleaf Alexander	0.8	0.24
Stiff Sunflower	0.5	0.14
Giant Hyssop	1.8	0.54
American Vetch	9.0	2.70
Maximilian's Sunflower	2.8	0.84
False Sunflower	0.1	0.03
Many Flowered Aster	0.2	0.06
Showy Goldenrod	0.5	0.15
Prairie Clover, White	26.5	4.50
Prairie Clover, Purple	15.0	7.95
Buckwheat	5.6	1.65
Phacelia	2.0	0.60

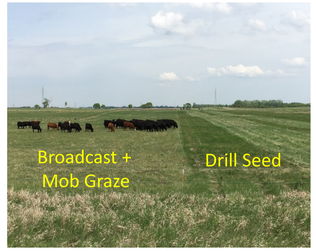


Figure 2. Mob grazing after broadcast seeding June 10, 2019

Figure 3. Leah Rodvang (MBFI) broadcast seeding June 10, 2019.

Results

2019 Results

- Buckwheat was observed to have germinated in all seeded plots in July 2019 but establishment counts conducted at end of August (Figure 4 & 6) only found buckwheat in the chemical suppression treatments.
- Chemical suppression treatment had several flowering species growing in both the drill and mob seeded treatments (e.g. buckwheat, phacelia, purple prairie clover, white prairie clover, alfalfa, sanfoin, ladino clover, American vetch and Maximillian's sunflower).

2020 Results

- No annual species were present and perennial species diversity was lower than observed in 2019 (Figure 5 & 7).

Figure 4. 2019 Establishment Counts (plants/m²)

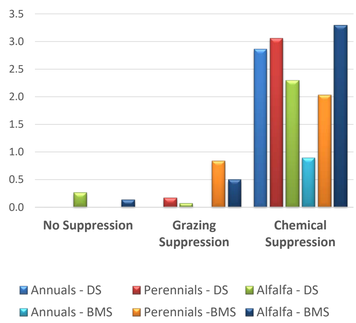
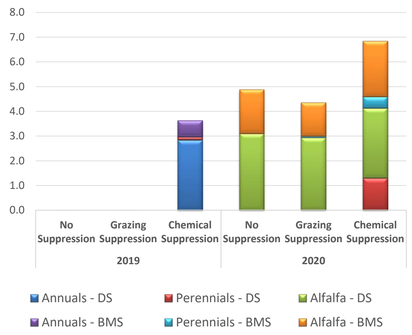


Figure 5. 2020 Flowering Stem Counts (plants/m²)



Results Continued

- Flowering stem counts found alfalfa the most abundant flowering plant present with purple prairie clover, Maximillian sunflower and ladino clover occurring less frequently.
- More establishment occurred in the drill seeding method than the broadcast and mob graze method.
- Alfalfa was found in all plots while other perennials were found solely in the chemical suppression treatments.
- Alfalfa was found in higher abundance in 2020 compared to 2019. Some of the increase is attributed to pre-existing alfalfa prior to seeding, that has been re-invigorated by the shift in grazing to a short duration - high intensity grazing system.
- Forage yield was variable within some plots with no consistent pattern other than chemical suppression being generally higher than other suppression methods.
- Paddock average yield was 2760 lb/ac and considered a moderately healthy tame pasture.
- There was no significant or consistent increase or decrease in quality of forage with any of the seeding or suppression techniques, which is not surprising since there was no significant shift in the perennial vegetative composition as a result of the plantings.
- This pasture, as sampled in July, appears to be short of feed requirements, but the samples were taken on older grass than what the cows would have eaten in May.
- Cow-calf pairs are supplemented with free-choice mineral to address borderline to deficient macro-mineral availability in the forage.

Figure 6. Chemical suppression plot with buckwheat in foreground, August 21, 2019

Figure 7. Chemical suppression plot, July 29, 2020.

Discussion

- After two years it appears chemical suppression is better than grazing suppression for limiting vigour of the existing grass species to allow less competitive seedlings to establish.
- Drill seeding had better performance compared to the broadcast/mob seeding method.
- Forage quality is generally poor but quantity is moderate.
- It is important to note that soil moisture during germination and establishment was poor and this may bear some responsibility for the disappointing establishment results.
- Suppression treatments may work better on poorer quality pasture. Future experimentation on this site (relatively healthy pasture) may include seeding flower strips under better moisture conditions and more effective chemical control.

Acknowledgements

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References:
1. https://xerces.org/pollinator-conservation/ (Accessed November 26, 2017)
2. Agriculture and Agri-Food Canada (2014) Native Pollinators and Agriculture in Canada. Agriculture and Agri-Food Canada, Ottawa, ON. (Accessed November 26, 2017)
3. https://www.beefresearch.ca/research/feed-value-estimator.cfm (Accessed January 26, 2021).