Testing of Brassicas and Forbs for Forage Production and Inclusion in Cocktail Mixtures

Trial Site: Fairview Research Farm
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Data from 2019


Daikon radish

Forage Brassicas are cool-season annuals that can be utilized as pasture, fall grazing and swath grazing in winter. Brassicas are quick maturing plants and can be grazed as early as 60 days after planting, (with the right weather conditions) depending on species. Brassicas are also useful in remediating soils high in Phosphorus (P) because they take up P and incorporate it into their plant tissues.

Nitrate poisoning and bloat have been reported in beef cattle consuming pure brassica pastures, but this can be avoided by seeding brassicas in mixtures with other forage species. Forbs are leafy plants such as chicory and plantain. The table below shows the varieties of Brassicas and Forbs that were seeded this year, with respective seeding rates.

Brassica Varieties	Forb Varieties
Tillage Radish – 4lb/acre Vivant Forage Brassica 4lb/acre Purple Top Turnips – 4lb/acre Winfred Forage Brassica – 4lb/acre Daikon Radish – 4lb/acre Malwira Turnip Rape – 4lb/acre Akela Brand Forage Rape – 4lb/acre Inka Brand Marrow Stem Kale– 4lb/acre Bayou Kale Cross – 4lb/acre Forage Collards – 4lb/acre	Phacelia – 4lb/acre Chicory – 5lb/acre Plantain – 4lb/acre Buckwheat – 60lb/acre

Dry Matter (DM)

The forage DM yield was far higher for buckwheat (with 5.8 tonnes DM yield/acre) than other forbs and brassicas tested in the project.

For the brassicas, the highest forage DM yield was produced by Inka brand marrowstem kale (7,400 lb/acre) , followed by tillage radish (7,006 lb/acre), daikon radish (6,928 lb/acre)


Vivant forage brassica


Winfred forage brassica


Inka brand Marrowstem kale

and Winfred forage brassica (6,394 lb/acre). Purple top turnips produced the lowest forage DM yield (2,631 lb/acre).

For the Forbs, the lowest forage DM yield came from chicory with 2,369 lbs/acre. Buckwheat produced 4,226-9,257 lbs/acre more forage DM yield than all other forbs and brassicas tested.

Forage Quality

The forage crude protein (CP) content of these crops varied from 11.4% for buckwheat to 26.0% for purple top turnips (Table 1). The forage CP was generally high. Except for buckwheat, all forbs and brassicas far exceeded the protein requirements of both young (12-14% CP) and mature beef cattle. (11% CP).


Purple top turnip

The total digestible nutrients (TDN%) or energy content, varied from about 63% TDN for phacelia to about 77% TDN for Bayou kale cross. Except for phacelia, which only had adequate TDN for dry gestating beef cows that need 55-60% TDN, other crops exceeded the 65% TDN needed by lactating beef cows.

All crops had high forage Ca and K, and all crops would meet the requirements of mature beef cows. All crops had sufficient P and Mg for dry gestating beef cows. However, forage collards, phacelia, plantain and buckwheat fell short of the 0.26% P needed by lactating beef cattle. And malwira turnip rape and Inka brand marrow stem kale fell short of the 0.2 Mg requirements by lactating beef cows.

All brassicas and most forbs had high forage CP, TDN, Ca and K. In general, including any of these crops in cover crop cocktail mixtures should improve the forage quality of your cocktail.

Nitrate Content

Agriculture Alberta Nitrate Content Chart

Category	% NO_3	% NO_3-N	% KNO_3	Remarks
1	0.5	0.12	0.81	Generally safe
2	0.5-1.0	0.12-0.23	0.81-1.63	Caution
3	1.0	0.23	1.63	High nitrate problems

The forage nitrate-N content of the crops tested varied significantly. The nitrate-N was highest in phacelia (0.56%), followed closely by Winfred forage brassica (0.53%), then bayou kale cross (0.36%) and plantain (0.35%). Purple top turnips, chicory, and tillage radish, had 0.15-0.29% forage nitrate-N. Only 7 of the 14 crops tested in this project for nitrate-N content would be considered to have generally safe levels of nitrate-N (0.12% N03-N) for beef cattle.

The crops with safe nitrate-N levels in this study are Vivant forage brassica, Daikon radish, Malwira turnip rape, Akela Brand Forage Rape, Inka Brand Marrow stem Kale, Forage Collards, Forbs and Buckwheat.

Generally, going by the nitrate-N test results in this study, caution would need to be taken by producers when feeding mixtures with higher nitrate yielding brassicas or forbs.

For more information on PCBFAs Alternative Brassica and Forb research, contact a member of our team!