

Forage Brassicas Potential As Supplemental Forage For Grazing In North Dakota

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Forage brassicas have been used in different areas around the world, especially in northern part of Europe, Australia, New Zealand, and North America (USA and Canada), for several centuries. These forage species have been used as supplemental forage due to their tolerance to low temperature, forage availability in the fall and winter when most traditional forage grasses and legumes are not available or have low quality to animals, high quality for animal feed included, and the possibility to extend the grazing season for livestock operations, reducing the operational cost to farmers and improving the profitability of the operation.

In the United States, brassicas were used in the late 19th century and early 20th century, but thereafter were abandoned due to the high cost to produce them. In the 70's and 80's the interest to produce brassicas (as forage and cover crops) was renewed. The research was important in some regions of the US, but not in others such as the Northern Plains. In North Dakota, some forage brassicas such as radishes and turnips are used as cover crops after cereal crops, but usually in mixture with other cover crops. In 2010, the estimated acreage planted to forage brassicas was approximately, 120,000 acres (calculated by estimating the seed sales).

North Dakota growers could extend the grazing season with forage and cover crops of brassicas species reducing their costs, improving profitability of farming operations by providing high quality feed for late-season use. As well those growers that do not have cattle in their farming system can benefit of using forage brassica as cover crops to improve soil health by reducing soil erosion, increasing water infiltration, reducing soil compaction, suppressing weed seeds germination, and some potential pests in the soil. In addition, they will have alternative crops to introduce in their cropping system, reducing the negative effects of short rotations.

The objectives of this study was i) to evaluate different cultivars of brassicas species as full-season forages and as cover crops in different environments in North Dakota; and ii) to determine their adaptability, yield potential, and nutritional quality for animal production.

The experiment had six brassica species such as kale (*Brassica oleracea* L.), swede or rutabaga [*Brassica napus* var *napobrassica* (L.) Mill], ethiopian cabbage (*Brassica spp*), turnip (*Brassica napus*), winter canola (*Brassica napus*), winter camelina (*Camelina sativa* L.), and several cultivars of each one of the crops. The experimental design was a randomized complete block (RCBD), with three replicates. The plots had 8 rows spaced at 6 inches and 20 ft in length. Seeding date was 25 and 26 April at Fargo and Carrington, respectively. Kale and swedes were harvested with a flail forage harvester only once, while forage rape, winter canola, and Ethiopian cabbage were harvested twice.

Preliminary results for 2012 indicate, forage brassica hybrids and forage rape had the highest biomass yield, in spite of the drought occurred in 2012 at Fargo (Table 1). Carrington lighter soil texture had less water retention under drought conditions than Fargo clay soils. This might explain the lower biomass yield of all brassicas except for one kale cultivar. The 'Maris Kestrel' kale had the greatest biomass yield at locations, 4.8 and 5.1 tons/acre at Carrington and Fargo, respectively. The 'Barsica' forage rape had a biomass yield of 6.2 ton/acre at Fargo. We were surprised to see that some of forage brassica yields were higher than those for seasonal alfalfa yield in plots adjacent to the forage brassicas. These are preliminary results, but are a first

indication of the potential of forage brassicas in North Dakota. They sure look very promising for our region.

Table 1. Forage brassica dry matter biomass yield at Fargo and Carrington, ND, in 2012.

Species	Cultivar	Carrington	Fargo	Combined
		tons/acre		
Kale	Siberian	1.5	3.6	2.6
Kale	Maris Kestrel	4.8	5.1	5.0
Kale	Dwarf Blue Vates	2.7	3.9	3.3
Swede	Major Plus	3.3	5.0	4.2
Swede	American Purple Top	2.6	4.4	3.5
Hybrid	Winfred	2.9	5.7	4.3
Hybrid	Pacer	2.7	5.2	4.0
Forage Rape	Rangi	2.5	5.6	4.0
Forage Rape	Barsica	2.6	6.2	4.4
Forage Rape	Dwarf Essex	2.2	4.7	3.5
Forage Rape	Bonar	2.3	5.8	4.1
Winter Canola	Riley	2.6	4.6	3.6
Winter Canola	Griffin	2.3	4.8	3.5
Winter Canola	Athena	2.3	4.4	3.3
Winter Canola	Summer	2.1	4.4	3.3
Winter Camelina	Joelle	0.7	1.2	1.0
Ethiopian Cabbage	Ethiopian Cabbage	2.8	2.4	2.6
LSD, 0.05		0.8	1.5	1.6
CV, %		21	19.4	20

Kale, and swedes were harvested once. Forage rape, winter canola, Ethiopian cabbage, and winter camelina were harvested twice.



Fig. 1 Swede root after first snow fall in Fargo in November 11, 2012.



Fig. 2 Kale plant, foliage still alive for grazing, November 11, 2012, Fargo, ND.



Forage brassica trial after harvest, only border rows are left, 11 November 2012, Fargo, ND.