NORTH DAKOTA– Fertilization of Full-Season Forage Brassicas for Grazing

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Species in the Brassicaceae family, hence forth brassicas, such as forage kale [*Brassica oleracea* L. *convar acephala* (DC)], swede (*B. napus* L. var. *napobrassica*), turnip [*Brassica rapa* L. var. *rapa* (L.) Thell).], and hybrids (*B. rapa* L. x *B. pekinensis* L. or B. *rapa* L. x *B. oleracea* L.) have become an important source of forage for grazing worldwide. One of the limitations of forage brassicas is the relatively higher water content and low forage yield in rain-fed environments. The objective of this study was to determine swede and kale forage yield and nutritive value response to various nitrogen (N) and sulfur (S) fertilization rates. The study was conducted at two experimental field sites in North Dakota. Kale (Maris Kestrel) and swede (Major Plus) with five N rates (0, 56, 112, 180, and 224 lbs N/ac) and two rates of S (0 and 45 lbs S/ac) were evaluated. Swede total forage yield was greater than kale across all N and S rates (Table 1). Compared with no N fertilization, N fertilization increased total leaf and root/stems yield and N accumulation in leaves, roots, and stems. Sulfur did not affect forage yield. Forage nutritive value was greater in swede than kale due to swede's higher proportion of edible root compared with kale's higher proportion of fibrous stems. These results suggest farmers will benefit from greater forage yield in kale and swede if they fertilize with more than 180 lbs N/ac. Swede and kale represent interesting and valuable alternative forage crops for beef cattle operators in the northern Great Plains.

Table 1. Swede and kale root/stem yield and leaf + root/stem yield with five N and two S rates averaged across environments at Prosper and Walcott, ND, in 2012 and 2014.

	Root/stem yield		Leaf + root/stem yield	
N rate	**S rate (lbs/ac)**			
(lbs/ac)	0	45	0	45
Swede (tons DM/ac)				
0	2.99	2.45	4.11	3.61
56	2.99	3.08	4.11	4.38
112	3.13	3.39	4.78	4.86
180	2.72	4.06	4.20	6.11
224	3.88	3.79	5.54	5.63
Kale (tons DM ac)				
0	0.98	1.07	1.92	2.32
56	1.25	0.98	2.32	2.00
112	1.16	1.47	2.41	2.67
180	1.52	1.52	2.99	3.21
224	1.52	1.83	3.13	3.66
LSD_1	0.89		1.07	
LSD_2	1.02		1.47	
LSD_3	0.76		1.21	

LSD_1 to compare between means of species for a same rate of N and S in different species.
LSD_2 to compare between means of S rates for same N rate and species.
LSD_3 to compare between means of N rates for same S rate and species.