NORTH DAKOTA - Do Higher Alfalfa Seeding Rates Increase Forage Yield and Quality in the Seeding Year?

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Many alfalfa growers in the north central region are being encouraged to increase alfalfa seeding rates to obtain higher forage yields in the seeding year and benefit from the current high hay prices. Previous research indicates seeding rates above 11 lbs/ac do not increase forage yield in the seeding year, nor have an impact on plant density, stand persistence, or forage quality. The study objectives were: 1) to determine the relationship between plants and stem density, and forage yield in glyphosate-tolerant alfalfa in the seeding year, and 2) to determine the optimal and economical seeding rate to maximize forage yield in the seeding year. A replicated experiment was established in 2013 at three locations: Fargo, Prosper, and Carrington. The experimental design was a RCBD with six seeding rates (1, 4, 9, 13, 18, and 22 lbs/ac) and three replicates; the variety planted was RR Prezeed. Each plot was 22' long with 8 rows spaced 6" apart. Once established, the plots, plant density, and stem density was evaluated after the last harvest in 2013. An economic analysis was conducted to determine the optimum economical seeding rate calculating the incremental forage yield with each seeding rate. Seed prices of $8.50/lb and $6.50/lb for RR and conventional seed were used, respectively. Seasonal forage yield (sum of two cuts) combined from all locations fluctuated between 1.99-3.01 tons/ac (Table 1). As seeding rate increased, forage yield increased, but only up to 13 lbs/ac. The plant and stem density also increased only to 13 lbs/ac seeding rate. Maximum forage yield was obtained with 7-8 plants/ft^2 and a stem density of 40-50 stems/ft^2. Increasing the seeding rate to 22 lbs/ac did not increase yield, plant density, or forage quality. Alfalfa plants self-thin soon after emergence when seedling density is high. The economic analysis indicated there is little justification for seeding rates above 9 lbs/ac because the cost of additional seed is greater than the incremental increase in forage yield (Table 1). The recommendation is to put time and effort into preparing a good seedbed rather than increasing the seeding rate to compensate for a poor seedbed.

Table 1. Economic analysis of increasing seeding rates in glyphosate and conventional alfalfa in the seeding year.

Seeding Rate	Forage Yield	Seed Cost/ac (S)		Gross Revenue (G) @200/ton	G_{max}-G_x	G-S	
(lbs/ac)	*(tons/ac)*	@$8.50/lb	@$5.50/lb	*$*	*$*	@$8.50/lb	@$6.50/lb
1	1.99	8	5	398	208	200	203.1
4	2.66	38	25	532	74	36	49.5
9	**2.69**	**76**	**49**	**538**	**68**	**-8**	**18.9**
13	2.87	114	74	574	32	-82	-41.6
18	3.03	152	98	606	0	-152	-98.1
22	3.01	190	123	602	4	-186	-118.7