Minnesota - Cool-Season Perennial Grass Performance at a Winter Wastewater Application Site
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A potato processing facility in northern Minnesota practices year-round wastewater application to cropland. Wastewater applied during winter creates an ice sheet several feet thick that is detrimental to plant persistence. At that facility, forage yield, N and P uptake, and winter survival of 'Palaton' reed canarygrass was compared with 'Orion' orchardgrass, 'Baylor' smooth bromegrass, 'Climax' timothy, and a native quackgrass.

Table 1. *Forage DM yield, N and P uptake, and winter survival of 5 perennial grasses in northern MN.*

Grass	1st Production Year			2nd Year Spring Ground Cover
	Forage Yield	N Uptake	P Uptake	
	Ton DM/ac	----------*Lb/ac*----------		*%*
'Palaton' reed canarygrass	3.0	117	27	25
'Orion' orchardgrass	3.2	118	21	2
'Baylor' smooth bromegrass	3.1	109	21	56
Common quackgrass	2.4	93	16	95
'Climax' timothy	3.1	116	20	25
LSD (0.05)	0.3	9	2	17

In the year following seeding, all grasses yielded similarly except common quackgrass which had about 25% less DM yield (Table 1). Phosphorus uptake was more variable among grasses, with reed canarygrass having greater P uptake than other grasses. Nitrogen uptake was similar for reed canarygrass, orchardgrass, and timothy. Quackgrass had the least P uptake. Nitrogen and P uptakes were strongly influenced by DM yield, as forage N and P concentrations (averages of 1.8% and 0.4%, respectively) were similar for all grasses. Low N concentrations in forages were due to leaching of soil N at the site.

Excellent stands of all grasses (>30 plants ft^2) with at least 95% ground cover were established. However, a lack of early-season snow cover combined with the application of 12" of wastewater caused an ice sheet that lasted from December-March. This resulted in significant stand loss of all grasses except quackgrass. Orchardgrass suffered nearly complete stand loss, while reed canarygrass stand losses were only 25%. Smooth bromegrass stand losses were intermediate and averaged 56%.

For winter wastewater application sites, quackgrass should be considered as an alternative to reed canarygrass when grass persistence and ground cover is important. Though less persistent than quackgrass, smooth bromegrass had greater DM yield and nutrient uptake.