Compatibility of a Mixture of Canada, Virginia and Riverbank Wildrye Seeded with Seven Individual Species of Native and Introduced Cool Season Grasses

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Objective

There is interest in the use of native cool season grasses for erosion control plantings on forest roadways, and for other construction activities, as well as for wildlife habitat. This study was set up to evaluate a base mixture of wild ryes planted in combination with 4 native and 3 introduced cool season grasses at 3 seeding rates.

Materials and Methods

The study was conducted in Big Flats NY on a Unadilla silt loam soil on a 2% slope. The field was conventionally prepared and was cultipacked before and following planting on 8/17/04.

A mixture of Canada wildrye (*Elymus canadensis*), Virginia wildrye (*Elymus virginicus*) and riparian wildrye (*Elymus riparius*) was planted at 20 lbs/ac (in a 1:1:1 ratio) using a Tye drill. The companion species were hand seeded individually over the wildrye in 10 x 20 ft plots in a completely randomized block design with four replications. The species and their seeding rates are outlined in Table 1.

On 8/17/05 and 6/15/06 two 2 x 2 ft biomass samples were cut from each plot, the wildrye mixture and the companion species were separated and dry matter was determined for each. Visual ratings were made on each of the plots for density of: weeds, wildrye mixture and companion species on those dates.

Table 1. Species, seed size and seeding rates of planted species

Latin Name	Common name	Seeds/lb	Seeding Rates (lb/ac)
Agrostis perennans	upland bentgrass	8,000,000	.25, 5.0, 1.0
Agrostis scabra	rough bentgrass	5,000,000	.25, 5.0, 1.0
Agrostis gigantea *	red top	4,851,200	.25, 5.0, 1.0
Bromus ciliatus	fringed bromegrass	236,000	3.0, 6.0, 9.0
Festuca rubra *	red fescue	245,185	3.0, 6.0, 9.0
Lolium arundinaceum [1 *]	tall fescue	205,720	3.0, 6.0, 9.0
Poa Palustris	fowl bluegrass	1,900,000	0.5, 1.0, 2.0
Elymus canadensis [2]	Canada wildrye	114,000	
Elymus riparius [2]	riparian wildrye	125,000	
Elymus virginicus [2]	Virginia wildrye	73,000	

[1] *Festuca arundinacea* is synonym for tall fescue
[2] The wildryes were conventionally seeded at 20 lbs/ac at a ratio of 1:1:1
* non native species

Table 2. Wildrye and companion planting weights, rating and weed control 2005

Species & lb/ac	Companion [1] ave. wt (g)	Wildrye [1] ave. wt. (g)	8/16/2005 weed rating [2]	8/16/2005 wildrye den. [2]	8/16/2005 comp. den. [2]	ave.(g) comp.	ave.(g) wildrye
Tall Fecue 3	160.3	40.8	1.8	7.3	1.8		
Tall Fecue 6	150.8	31.5	2.8	7.3	2.5		
Tall Fecue 9	251.8	60.5	1.8	9.0	1.0	187.6	44.3
Fringed Bromegrass 3	11.0	251.8	6.5	2.0	8.3		
Fringed Bromegrass 6	15.0	232.8	5.5	1.3	7.8		
Fringed Bromegrass 9	27.5	242.3	6.0	2.3	7.3	17.8	**242.3**
Rough bentgrass 1/4	177.5	63.8	1.8	7.8	1.3		
Rough bentgrass 1/2	200.8	38.0	1.3	9.0	1.3		
Rough bentgrass 1	214.0	18.5	1.3	9.0	1.0	197.4	40.1
Fowl bluegrass1/2	107.5	132.8	3.5	3.0	3.0		
Fowl bluegrass 1	84.5	107.8	4.0	4.5	3.3		
Fowl bluegrass 2	93.3	116.8	4.3	5.3	1.5	95.1	**119.1**
Red fescue 3	77.8	66.3	3.8	6.5	2.5		
Red fescue 6	102.8	45.0	4.0	6.0	3.0		
Red fescue 9	145.0	34.0	3.8	7.8	1.3	108.5	48.4
Agrostis perennans 1/4	211.0	62.8	1.5	6.8	2.0		
Agrostis perennans 1/2	202.8	18.0	1.3	8.5	1.3		
Agrostis perennans 1	173.0	14.0	1.0	8.3	1.0	195.6	31.6
Red Top 1/4	176.0	27.5	1.5	8.0	1.3		
Red Top 1/2	194.3	16.3	1.3	8.0	1.0		
Red Top 1	268.0	23.8	1.3	9.0	1.0	212.8	22.5
Control		329.8	4.0	1.3			**329.5**
$LSD_{.05}$	94.3	82.6					

1 - Wildrye and companion species are dry weights in grams from 4 ft2 of plot area cut 8/16/05
2 - Weed Control 1 =100% weeds 9 =10% weeds, density rating 1 =100% cover, 9 =10%

Fig.1 rough bentgrass .25 lb/ac prevented wildrye establishment, 8/16/05

Fig. 2 wildrye mixture alone, successful wildrye establishment, 8/16/05

Table 3. Wildrye and companion planting weights, rating and weed control 2006

Species & lb/ac	Companion [1] ave. wt (g)	Wildrye [1] ave. wt. (g)	7/15/06 weed rating [2]	7/15/06 wildrye den. [2]	ave.(g) comp.	ave.(g) wildrye
Tall Fecue 3	156.0	20.8	1.3	8.5		
Tall Fecue 6	193.5	28.0	1.5	8.8		
Tall Fecue 9	133.3	15.8	1.3	9.0	160.9	21.5
Fringed Bromegrass 3	66.8	186.0	2.8	2.0		
Fringed Bromegrass 6	63.8	136.8	2.8	2.5		
Fringed Bromegrass 9	55.5	137.5	2.8	2.8	62.0	**153.4**
Rough bentgrass 1/4	154.0	29.0	1.5	8.5		
Rough bentgrass 1/2	147.5	14.0	1.0	8.8		
Rough bentgrass 1	138.0	15.0	1.0	9.0	146.5	19.3
Fowl bluegrass1/2	101.3	97.5	2.3	4.0		
Fowl bluegrass 1	111.8	56.5	1.8	6.3		
Fowl bluegrass 2	115.5	51.3	1.3	6.5	109.5	**68.4**
Red fescue 3	128.8	43.8	3.0	7.3		
Red fescue 6	109.5	31.5	2.0	7.5		
Red fescue 9	131.0	27.3	2.0	8.3	123.1	34.2
Agrostis perennans 1/4	128.8	36.8	1.8	7.5		
Agrostis perennans 1/2	150.0	16.3	1.3	8.8		
Agrostis perennans 1	115.0	12.0	1.0	9.0	131.3	21.7
Red Top 1/4	160.8	24.3	1.0	8.0		
Red Top 1/2	136.8	24.5	1.0	8.5		
Red Top 1	202.0	12.0	1.0	9.0	166.5	20.3
Control [3]	74.3	199.8	3.0	1.3		**199.8**
$LSD_{.05}$	76.5	38.4				

1 - Wildrye and companion species are dry weights in grams from 4 ft2 of plot area cut 6/14/06
2 - Weed Control 1 =100% weeds 9 =10% weeds, wildrye density rating 1 =100% cover, 9 =10%
3 - Control plots weeds were measured instead of companion specie

Results

Wildrye:
The wildrye biomass (grams/4ft2) in both 2005 & 2006 was significantly higher in the control, consisting of the wildrye mix alone, and the fringed bromegrass/wildrye mix at all of the 3 fringed bromegrass seeding rates. In 2006 the fowl bluegrass (.5 lb/ac)/wildrye mix had the next significantly highest wildrye content. In both years there were trends for all 3 fowl bluegrass companion seeding rate treatments to have the next highest wildrye content. In 2006 the overall yield of the wildrye was lower in part due to the earlier harvest date. The wildrye biomass averaged over years and seeding rate was 197.9 g and 93.8 g for the fringed bromegrass and fowl bluegrass mixtures respectively compared to 25.9 g for the average of all *Agrostis* sp. and 37.1 g for the fescues. See Tables 2 & 3 for the data summary.

Results

Companion species:
There were no significant biomass differences within companion sp. due to their seeding rates. In 2005 the biomass in grams/4 ft2 for the companion sp. averaged over seeding rates for the fringed bromegrass (17.8 g), fowl bluegrass (95.1 g) and red fescue (108.5 g) was lower than the other species which averaged (198.4 g). In 2006 despite the earlier harvest date there was an increase in companion sp. biomass for the fringed bromegrass (62.0 g), fowl bluegrass (109.5 g) and the red fescue (123.1 g). There was a slight decrease in the other species biomass. See Tables 2 & 3 for the data summary.

Discussion & Conclusion

There is a challenge in developing seeding mixes of native cool season grasses due to the variation in the number of seeds per pound. Even at the 0.25 lb/ac rate the *Agrostis* sp., dominated the stand and did not allow for the establishment of the wildrye mix (fig.1) compared to the wild rye alone (fig.2). The wildrye mix alone at 20 lb/ac may not provide the quick dense cover for erosion control. This rate allows for more diversity of naturally occurring forbs but also allows for weed encroachment.

The fringed bromegrass at 9 lbs/ac (fig.3) and the fowl bluegrass at .5 lbs/ac (fig.4) were compatible with the wildryes, it may take a few more years to see how the species will sort out.

The *Agrostis* sp. at the .5 – 1.0 lbs/ac (fig. 5) was very effective in preventing any weed growth. This may be useful in some applications for early erosion control while allowing for later colonization of other native species.

The tall and red fescue were too competitive to allow for successful establishment of the wildrye mix even at the 3 lb/ac rate. They provided very good cover and weed control, even at that rate.

Fig. 3 fringed bromegrass allowed for wildrye establishment, 8/16/05

Fig. 4 fowl bluegrass at .5 lb/ac allowed for wildrye establishment, 8/16/05

Fig. 5 Agrostis perennans 1lb/ac prevented weed encroachment, 8/16/05