

# Salinity Tolerance of Kentucky Bluegrass

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## Summary

This trial was seeded in late May of 2009 to evaluate various Kentucky bluegrass varieties for their salinity tolerance. Forty-four individual Kentucky bluegrass varieties, two Kentucky bluegrass blends, Fult's alkaligrass and Scottish Links blend were evaluated for their establishment under saline conditions. Salinity, as measured by electrical conductivity, ranged from 1.1 to 4.1 ds/m<sup>2</sup>, which would be considered low to moderate salinity. Kentucky bluegrass is rated as 'sensitive' when considering salinity tolerance. Fult's alkaligrass established the best of any of the grasses that were seeded. Of the Kentucky bluegrasses, the variety, Washington, established the best. Salinity was quite variable between the replications in this trial and may have compromised the data in year one of this trial. This trial will be rated for at least one more year.

## Introduction

The majority of the population in Canada is reliant on a public water supply to meet domestic needs in urban households. If public water utilities are to increase the amount of water available for domestic use their options are to build additional infrastructure on existing bodies of water, to locate and develop new water sources, or to reduce the amount of water required for domestic, agriculture and recreational purposes.

If water use is to be reduced for agriculture and recreational purposes increased water efficiency must be accomplished. This can be done by selecting crops and turfgrasses that require less water, improving delivery methods, improving the efficiency of the water applied, or using non-potable/poor quality water.

Waters that are saline in nature are considered to be of poor quality and have also been shown to be growth limiting. Kentucky bluegrass is one predominant grass species used for turf in North America. However, it is not considered to be either drought or saline tolerant.

This trial was established to test the salinity tolerance of Kentucky bluegrass varieties in comparison with a fine leaf fescue blend and a salt tolerant grass, Fult's alkaligrass.

## Materials and Methods

On May 26, 2009 a trial was established on a saline soil at Eagle Lake Turf Farms in Strathmore, Alberta. Test plots measuring 1.5 X 2 metres were seeded in a saline area adjacent to an irrigation drainage ditch. Using a shaker bottle, pre-measured lots of grass seed were uniformly applied to the soil surface of each the plots. This was followed by a light raking of each plot to cover the seed. Forty-four individual Kentucky bluegrass varieties, two Kentucky bluegrass blends, Fult's alkaligrass and Scottish Links blend were replicated three times within a randomized complete block design (RCBD) (Table 1).

## Insert picture #1

The soil electrical conductivity (EC) of the site was monitored over the course of the season. Soil cores were collected from the same locations within each replication to identify any changes in soil salinity. To determine the concentration of salt in each of the samples, a 2 to 1 dilution of distilled water to soil was prepared. The solution was stirred for 20 minutes before the salt concentrations were measured using a Hanna (model HI98129) conductivity meter.

The plots were evaluated on a monthly basis for area cover, which is a means to measure turfgrass establishment. These ratings were based on the National Turfgrass Evaluation Program (NTEP) protocols where numeric values were assigned to individual plots where 9 was best and 1 was poorest, and 6 was considered acceptable. Area cover was assessed by determining values that ranged from a 1 for a complete absence of turf to a 9 for complete cover with the desired turf. The presence of weeds or voids in the turf reduced this rating.

Table 1 – Salinity grass trial, Strathmore 2009.

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1. 4-Season	25. Concerto
2. Absolute	26. Moonlight
3. Award	27. Skye
4. Beyond	28. Brooklawn
5. Bluechip Plus	29. Crest
6. Everest	30. Washington
7. Everglade	31. Kingfisher
8. Freedom III	32. Alpine
9. Impact	33. Julius
10. Liberator	34. Orfeo
11. Limousine	35. Rampart
12. NuBlue Plus	36. Midnight
13. NuChicago	37. Moonshadow
14. Nu Destiny	38. Dragon
15. NuGlade	39. Boutique
16. Odyssey	40. Midnight II
17. Perfection	41. Summit 3D Blend
18. Rugby II	42. Summit Sod Blend
19. Rush	43. Bewitched
20. Solar Eclipse	44. Prosperity
21. Sudden Impact	45. Moonbeam
22. Tsunami	46. Bedazzled
23. Fults Alkaligrass	47. Midnight Star
24. Blue sapphire	48. *Scottish Links Blend

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\*Scottish Links blend – blend of creeping red fescue, hard and chewings fescue.

## Results

Fult’s alkaligrass showed the best establishment of any of the grasses (Table 2). As far as bluegrasses were concerned, Washington Kentucky bluegrass had quite good establishment. This grass also performed quite well in a previous study where drought stress was evaluated. Typically drought stress and saline tolerance are highly correlated. There was no significant difference in the other grasses when establishment was determined.

Insert picture #2.

Table 2 – Establishment data for salinity grass trial, Strathmore 2009.

Cultivars	Days After Seeding		
	21 Days	49 Days	112 Days
	1 – 9 scale		
4-Season	1a	2bc	2bc
Absolute	1a	2bc	1c
Award	1a	2bc	1c
Beyond	1a	3ab	3bc
Blue Chip Plus	1a	2bc	3bc
Everest	1a	2ab	2bc
Everglade	1a	1c	1c
Freedom III	1a	3ab	1c
Impact	1a	3ab	2bc
Liberator	1a	3ab	2bc
Limousine	1a	2bc	2bc
Nu Blue Plus	1a	3ab	2bc
Nu Chicago	1a	3ab	1c
Nu Destiny	1a	2bc	1c
Nu Glade	1a	1c	1c
Odyssey	1a	2bc	1c
Perfection	1a	2bc	1c
Rugby II	1a	2bc	2bc
Rush	1a	2bc	1c
Solar Eclipse	1a	2bc	1c
Sudden Impact	1a	1c	2bc
Tsunami	1a	1c	2bc
Fults Alkaligrass	1a	4a	6a
Blue sapphire	1a	1c	2bc
Concerto	1a	2bc	2bc
Moonlight	1a	2bc	1c
Skye	1a	1c	2bc
Brooklawn	1a	2bc	2bc
Crest	1a	2bc	2bc
Washington	1a	2bc	4ab
Kingfisher	1a	1c	2bc
Alpine	1a	3ab	2bc
Julius	1a	1c	2bc
Orfeo	1a	2bc	2bc
Rampart	1a	2bc	2bc
Midnight	1a	1c	2bc
Moonshadow	1a	1c	1c
Dragon	1a	4a	2bc
Boutique	1a	3ab	3bc
Midnight II	1a	3ab	1c
Summit 3D Blend	1a	3ab	2bc
Summit Sod Blend	1a	3ab	2bc
Bewitched	1a	4a	3bc
Prosperity	1a	4a	3bc
Moonbeam	1a	1c	2bc
Bedazzled	1a	2bc	2bc
Midnight Star	1a	2bc	2bc
Scottish Links Blend	1a	3ab	3bc
LSD <sub>0.05</sub> =	n/s	1	2

When setting up the plots, one sample was taken from each replication for the determination of soil salinity. It was thought that salinity would be greatest in the replication closest to the drainage ditch and would decrease the further away from the ditch. However, when the area was sampled more thoroughly, it was found that the salinity was greatest at the south end of the plots. It was obvious from the results that as soil salinity increased establishment decreased. Unfortunately, with the way that the plots were configured the data was thought to be compromised. The trial will be evaluated one more year to attempt to determine if any of the grasses are more saline tolerant.

Table 3 – Soil salinity at various sites within trial, Strathmore 2009.

	Days After Seeding						
	May 28th Initial	21 Days		84 Days		112 Days	
		South	North	South	North	South	North
	dS/m <sup>2</sup>						
Rep 1	2.8	2.3	1.7	4.2	2.1	3.3	0.8
Rep 2	3.1	1.8	1.1	3.1	2.7	2.1	1.1
Rep 3	2.6	3.3	1.2	4.1	3.0	3.3	1.7