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King Ranch Progress Report
Fall 2008

Switchgrass

The King Ranch brought in seed harvested from an observation plot in 2004. This plot was grown from seed collected from multiple populations of switchgrass on the King Ranch. The PMC was asked to assist with improving the germination and selection of this collection. Seed was planted in a flat in the greenhouse and seedlings that emerged by the seventh day were transferred to another tray. One hundred of these earlier germinating seedlings were planted in an observation plot in June of 2005 at the King Ranch Norias Division. The plot performed well, but plants were highly variable for multiple traits. Seed was collected from this plot in November and December and was germination tested in 2006. After seed was screened with a South Dakota seed blower for heavy seed, the November harvest had 65.9% germination and the December harvest had 95.5%.

In March of 2006, the 100 plants were evaluated for field traits. Only 43 were kept and the rest were removed. Seed was collected from these 43 plants individually in October and again in November 2006.

In July 2007, we evaluated the two seed harvests of October and November 2006 along with the field observations of October 2006. From this data, we felt, based on vegetative biomass and vigor along with seed harvest weight, percent seed fill, and germination, that we needed to further cull the existing switchgrass plants down to eight plants. These eight plants had an October 2006 mean harvest with 76% seed-fill and a November 2006 harvest of 35% seed fill.

Seed was harvested individually from these eight plants in November of 2007. In August 2008, this seed harvest was planted in a growth chamber (controlled environment chamber) at low light levels to select plants without internode elongation. This should provide germplasm with more drought tolerance. The resulting seedlings will be planted in a crossing block in the fall of 2008 at the Santa Gertrudis research plot.

Suggested Plan for Swichgrass

2005
- Seeded tray of switchgrass seed and took first 100 seedlings to germinate (7 days)
- Planted crossing block of 100 plants at Norias Division plots

2006
- Harvested seed from the 43 plants left in the Switchgrass plot
- Evaluated hardiness and vigor of the remaining 43 plants

2007
- Narrowed plot to top 8 plants
- Harvested seed from the 8 existing plants in November 2007
- Evaluated hardiness and vigor of 8 plants

2008
- Seed harvested from the remaining 8 plants in 2007 planted in growth chamber to look for internode elongation
- Plant resulting seedlings without elongated internodes in a crossing block at Santa Gertrudis plot
- Evaluate plants versus Alamo Switchgrass for germination, seedling vigor, survival, forage production, and seed production
- Harvest seeds from crossing block

2009
- Use seed harvested from Santa Gertrudis plot and repeat cycle (1x-3x) to select for drought tolerant and quick emerging germplasm

Switchgrass Plot Map

King Ranch - Norias Plot
Switchgrass 100 - Six Day Germ Plants
(North End) N →
Planted 6-30-05

	30’										
	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	
20’	*	*	X	8	X	X	X	X	8	*	Plant 10
	X	X	*	X	X	X	X	X	X	*	Plant 9
	X	X	8	*	X	X	X	X	X	8	Plant 8
	X	X	X	*	*	*	X	*	X	X	Plant 7
	*	X	*	*	X	X	*	X	8	X	Plant 6
	X	X	*	*	*	X	*	X	X	8	Plant 5
	*	X	*	X	*	X	X	*	X	X	Plant 4
	*	X	X	*	*	X	X	*	X	X	Plant 3
	*	*	*	*	X	X	X	X	X	*	Plant2
		*	X	8	X	X	8	*	X	*	Plant 1
ROAD N →											

10’ rows planted at 10 plants each, 2 feet apart.

***Note:** Map not to scale.

X = 57 plants taken out before 2006 harvest
* = 35 plants taken out before 2007 harvest
8 = 8 plants left for 2007 harvest

Brownseed

Norias: The PMC planted an advanced evaluation plot at the King Ranch, Norias Division in June of 2005. This consisted of the 5 accessions chosen from Beeville and a collection of Brownseed that the King Ranch brought in that they had been working with. This plot was evaluated for field performance in 2005. The King Ranch collection had the best performance. Accessions 9088644-Victoria and 9088681-Goliad also had good performance. Ergot was seen on all the accessions in November 2005. Seed was harvested in September 2005. This seed was germination tested in 2006. The King Ranch had a much higher harvest total than the other accessions. However it had the lowest germination percentage, although it still had significantly more PLS than the other accessions.

This plot was evaluated again for field performance in 2006. The King Ranch collection, accessions 9088644-Victoria, and 9088681-Goliad all had good performance. Two attempts were made to harvest seed, in September and October, but all seed had shattered due to rainstorms.

This plot was evaluated again for field performance in May of 2007 (Table 1). Again, the King Ranch collection, accessions 9088644-Victoria, and 9088681-Goliad all had better performance than the other accessions. Seed was harvested in May of 2007. Ergot was present on the seedheads of all accessions. This harvest will be germination tested in the fall of 2008. All plants were dormant by November.

***East Texas*:** Another AEP was planted at the East Texas PMC in Nacogdoches, Texas in July 2005. The plot was evaluated in November of 2005. They also reported ergot on all accessions, but to a lesser degree on the King Ranch collection. The plot performed well and had no other apparent disease or insect problems. A small sample of seed was collected in December, but this was after most of the harvest had shattered. This seed was germination tested in 2006. A small seed harvest was made in May and another in July of 2006.

The East Texas AEP plot was burned in Feburary of 2007. The King Ranch accession took 14-16 days to begin regrowth after the burn. The other accessions were faster and only took 7-10 days to begin regrowth. The plot was evaluated in March and October of 2007 (Table 2). Seed was collected in June of 2007. The 2006 and 2007 harvests will be germination tested in 2008.

***Seed Increase*:** The PMC seeded trays in December 2007 for an increase plot at the Norias Division of the King Ranch accession. Five hundred plants were planted in April of 2008. Seed harvests will be collected as produced.

***New Accessions*:** Six new accessions, that were received after the AEP plots were established, were planted at the Norias for initial evaluation in June of 2006. This plot was evaluated for field performance in 2006, but no seed was harvested due to shattering. All accessions performed well. One new accession (9093343-Harris Co.)

was seeded in the greenhouse in December 2006. Its germination was poor (0.8%), but it was reseeded in an effort to get enough plants to add to the plot in the spring of 2007. It was added to the plot in April of 2007.

This plot was evaluated for field performance in May 2007 (Table 3), and seed was harvested. Ergot was present on the seedheads of all accessions. All accessions performed well. All plants were dormant by November. One new accession (9093368-Aransas Co.) was seeded in the greenhouse in December 2007. It had 0% germination despite reseeding. In the spring of 2008, all of the new accessions had poor field performance and little regrowth. They will not be pursued to add to the release.

Suggested Plan for Brownseed Paspalum

2006 - Observed existing plot and take data at the Norias
- Harvested seed from the plot at the Norias
- Observed plot and took data at the East Texas PMC
- Harvested seed from the plot at the East TX PMC
- Ran Germination test on seed harvests

2007 - Observed existing plot and take data at the Norias
- Observed plot and took data at the East Texas PMC
- Harvested seed from the plot at the East TX PMC

2008 - Established a seed increase plot(s)
- Run Germination test on seed harvests

2009 - Harvest seed increase plot and increase if needed

2010 - Harvest seed increase plot
- Pursue seed release through NRCS

Table 1. Study Number: 77I049H Brownseed Paspalum Advanced Field Evaluation 2007

Norias Plot (sandy soil)

Accession Number	% Survival	Plant Vigor*	Foliage Density*	Resistance *	Uniformity *	Seed Production*	Seed Shatter*
9089219	37.5	6.0	6.0	6.0	5.0	5.0	5.0
9088644	70.0	3.8	3.8	3.8	5.0	4.5	5.0
9088647	50.0	5.8	5.8	5.8	5.0	5.0	5.0
9088681	62.5	4.0	4.0	4.0	5.0	4.0	5.0
9088651	32.5	5.5	5.3	5.5	5.0	5.5	5.3
King Ranch	72.5	4.8	4.5	4.5	5.0	5.0	5.0

*Ocular estimate (1 = Best & 5 = Average)

Table 2. Study Number: 77I049H Brownseed Paspalum Advanced Field Evaluation 2007

East TX PMC (sandy soil)

Accession Number	% Survival	% Seedling Recruitment	Plant Vigor*	Seed Production*
9089219	91.5	100	5.0	5.0
9088644	83.0	75	4.0	5.0
9088647	97.8	100	4.8	4.0
9088681	79.0	50	4.5	3.0
9088651	89.3	75	4.8	3.0
King Ranch	not evaluated	100	3.0	5.0

*Ocular estimate (1 = Best & 5 = Average)

Table 5. Study Number: 77I049H Brownseed Paspalum Initial Field Evaluation 2007

Norias Plot (sandy soil)

Accession Number	% Survival	% Regrowth	Plant Vigor*	Foliage Density*	Resistance *	Uniformity *	Seed Production*	Seed Shatter*
9089252	100	25	5.0	5.0	5.0	5.0	5.0	5.0
9093293	100	25	5.0	5.0	5.0	6.0	5.0	5.0
9093294	96	25	4.0	4.0	5.0	6.0	4.0	5.0
9090327	100	25	4.0	4.0	5.0	6.0	4.0	5.0
9090344	100	25	5.0	5.0	5.0	6.0	4.0	5.0
9090268	100	25	4.0	4.0	5.0	5.0	4.0	5.0
9093343	100	new	5.0	5.0	5.0	5.0	-	-

*Ocular estimate (1 = Best & 5 = Average)

Brownseed Paspalum Plot Map

King Ranch - Norias Plot
Brownseed A.E.P. (South End) N →
Planted 6-30-05

	Guard Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Guard Row 8
C4 10’	Guard Row Brownseed 9088681 10 plants	Brownseed 9064466 rep 4 10 plants	Brownseed 9088681 rep 4 10 plants	Brownseed King Ranch rep 4 10 plants	Brownseed 9089219 rep 4 10 plants	Brownseed 9088651 rep 4 10 plants	Brownseed 9088647 rep 4 10 plants	Guard Row Brownseed 9088681 10 plants
5’								
C3 10’	Guard Row Brownseed 9088681 10 plants	Brownseed 9089219 rep 3 10 plants	Brownseed 9088651 rep 3 10 plants	Brownseed 9088647 rep 3 10 plants	Brownseed 9088681 rep 3 10 plants	Brownseed King Ranch rep 3 10 plants	Brownseed 9064466 rep 3 10 plants	Guard Row Brownseed 9088681 10 plants
5’								
C2 10’	Guard Row Brownseed 9088681 10 plants	Brownseed 9089219 rep 2 10 plants	Brownseed King Ranch rep 2 10 plants	Brownseed 9088647 rep 2 10 plants	Brownseed 9064466 rep 2 10 plants	Brownseed 9088681 rep 2 10 plants	Brownseed 9088651 rep 2 10 plants	Guard Row Brownseed 9088681 10 plants
5’								
C1 10’	Guard Row Brownseed 9088681 10 plants	Brownseed 9088651 rep 1 10 plants	Brownseed 9088647 rep 1 10 plants	Brownseed King Ranch rep 1 10 plants	Brownseed 9064466 rep 1 10 plants	Brownseed 9088681 rep 1 10 plants	Brownseed 9089219 rep 1 10 plants	Guard Row Brownseed 9088681 10 plants
ROAD N→								

10’ rows planted at 10 plants each, 1 foot apart. 5’ spacing between reps.

***Note:** Map not to scale.