

TEXAS A&M UNIVERSITY  
KINGSVILLE, TEXAS

and

TEXAS AGRICULTURAL EXPERIMENT STATION  
BEEVILLE, TEXAS

and the

UNITED STATES DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE  
PLANT MATERIALS CENTER  
KINGSVILLE, TEXAS

NOTICE OF RELEASE OF CHAPARRAL GERmplasm HAIRY GRAMA  
SELECTED CLASS OF NATURAL GERmplasm

Texas A&M University-Kingsville (South Texas Natives Project), and Texas Agricultural Experiment Station at Beeville, Texas and the Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture (USDA), announce the release of a selected ecotype of hairy grama (*Bouteloua hirsuta* Lag.) for the south Texas ecoregion. Chaparral Germplasm, accession number 9093400, is a composite of 4 collections that were tested under the following accession numbers: 9086141, 9089054, 9086154, and 9088996.

As a selected release, this plant will be referred to as Chaparral Germplasm hairy grama. Chaparral Germplasm is released as a selected class of certified seed (natural track).

This alternative release procedure is justified because there are no existing Texas commercial sources of tested and adapted hairy grama. The potential for immediate use is high especially for highway right-of ways and in range seeding mixes for restoration and wildlife habitat.

**Collection Site Information:** Table 1 shows the origin and collection information of each accession, Figure 1 shows the field location of each collection. Each accession is made up of seed obtained from a single wild population of hairy grama. Seed was cleaned and stored for evaluation at the E. Kika De La Garza Plant Materials Center (PMC), in Kingsville, TX after field collection. No breeding or genetic manipulation was conducted on the accessions.

**Description:** Hairy grama is a cross, wind pollinated species. It is likely self sterile (Girija, 1968). The general botanical description of hairy grama is: Tufted perennial (but flowering the first year); culms numerous, 10-75 cm long, 0.5-2 mm thick, slightly geniculate at the lower nodes, essentially unbranched above the base; ligule a scale 0.1-0.3 mm long; blades occurring mostly in the lower half of the plant, 5-12 (-20) cm long,

**Table 1. Origin and collection information for Selected Plant Material of hairy grama.**

Accession	Date	County	Location	Soil type	Collector
9086141	11/15/2001	San Patricio	Welder Wildlife Refuge	Sandy loam	F. Smith & C. Lawson
9086154	11/1/2001	Kenedy	La Paloma Ranch	Sand	F. Smith
9088996	8/13/2005	Dimmit	Chaparral Wildlife Management Area	Sandy loam	F. Smith & C. Lawson
9089054	8/17/2002	Uvalde	FM 1002	Loam	F. Smith & P. Ortega

1-2.2 mm broad, flat basally, passing into a closely involute arcuate tip, usually pilose near the ligule and on the lower margins; spikes persistent, (1 or) 2 to 4 (to 6) per culm, 10-35 (-60) mm long, 3-6 mm thick, distributed over a panicle axis 1-8 (-19) cm long, the rachis apically subspinose, i.e., prolonged beyond the most distal fertile spikelet into a semi-rigid needle 3-11 mm. long (in one variety the needle terminating in a rudimentary spikelet); second glume on and near the keel with tubercles (at maturity the spikelet is black and usually visible to the unaided eye) and these with long white whiskers, rarely only short-pilose; spikelets 18-50 (to 70) per spike (Correll & Johnston, 1996).

The 4 accessions comprising this release exhibit 2 distinct types of ecotypic variation: a stoloniferous ecotype, and a non-stoloniferous ecotype. Hairy grama was observed to have a stoloniferous growth form in Brooks, County, TX, by Morrow et al. (1954). Subsequent study of this ecotype revealed the stoloniferous habit to be genetic and heritable. Morrow et al. (1954) states that the occurrence of this stoloniferous ecotype ranges from Lavaca to Wilacy Counties, TX. Hairy grama has also been documented to frequently reproduce vegetatively by Steiger (1930). Accessions 9086141 (San Patricio County) and 9086154 (Kenedy County), exhibit stoloniferous growth habits. Forage value of hairy grama is reported to be fair for livestock and poor for wildlife (Hatch et al., 1999). However, it is reported to occur in 67% of undisturbed sites in sand prairie community types, but in only 4% of grazed sites in South Texas (Johnston, 1963). When compared to other prairie grasses hairy grama has been shown to be extremely drought tolerant (Mueller & Weaver, 1942). Studies by Morrow et al. (1954) showed that some ecotypes of hairy grama survived and maintained themselves better than many associated grasses such as seacoast bluestem and brownseed paspalum in South Texas under drought conditions. Hairy grama contains approximately 800,000 seeds per pound.

**Potential Uses:** Hairy grama was targeted for collection by *South Texas Natives* because of the potential for use on highway right of ways, reclamation sites, and rangeland plantings.

**Method of Breeding and Selection:**

*Collection:* As part of an overall effort to collect, evaluate and release germplasms of a number of plants native to South Texas, personnel from *South Texas Natives* collected seed of hairy grama from 24 separate field locations during 2001-2003 (Table 2).

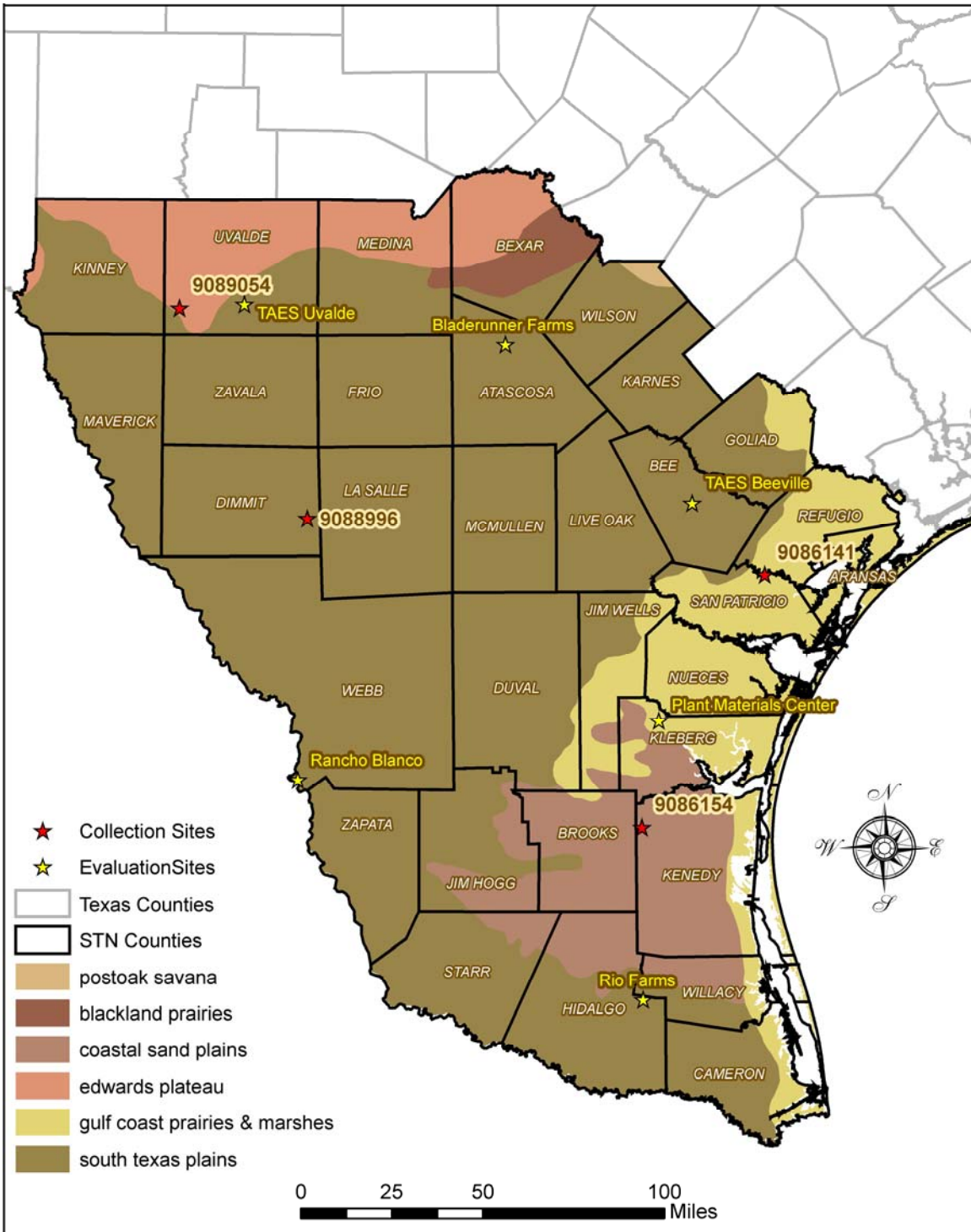
**Table 2. Collection information of 24 accessions of hairy grama obtained by *South Texas Natives* from 2001-2003.**

Accession	County	Location	Soil type
9086141	San Patricio	Welder Wildlife Refuge	Sandy loam
9086142	Kenedy	La Paloma Ranch	Sand
9086154	Kenedy	La Paloma Ranch	Sand
9088876	Webb	Cerrito Prieto Ranch	Sandy loam
9088910	Dimmit	Piloncillo Ranch	Sandy loam
9088991	Webb	Cerrito Prieto Ranch	Sandy loam
9088996	Dimmit	Chaparral WMA	Sandy loam
9089043	Webb	Piloncillo Ranch	Sandy loam
9089054	Uvalde	FM 1022	Loam
9089073	Dimmit	Piloncillo Ranch	Sandy loam
9089077	LaSalle	Chaparral WMA	Sandy loam
9089111	Goliad	Sarko Ranch	Sandy loam
9089152	Goliad	Sarko Ranch	Sandy loam
9089201	Medina	CR 742	Sand
9090345	San Patricio	Welder Wildlife Refuge	Sandy loam
9090391	Jim Hogg	Jones Ranch	Sandy loam
9090393	Jim Hogg	Jones Ranch	Sandy loam
9090417	Kinney	Anaoncho Ranch	Gravel/loam
9090427	Kinney	FM 334	Gravel/loam
9090437	Kinney	Anaoncho Ranch	Gravel/loam
9090445	Jim Hogg	Jones Ranch	Sandy loam
9090450	Jim Hogg	Jones Ranch	Sandy loam
9090455	Jim Hogg	Jones Ranch	Sandy loam
9090610	Maverick	Faith Ranch	Sandy loam

*Initial Field Evaluations:* Seed from these accessions was planted in the greenhouse at the E. Kika De La Garza Plant Materials Center (PMC) in December of 2002 and 2003. Seedlings grown from these plantings were planted for evaluation at Bladerunner Farms, near Poteet, TX (soil type Miguel fine sandy loam (USDA-SCS, 1977) (Figure 1) in 2003 and 2004. Of the 24 original collections, 11 collections produced enough plants for evaluation.

*Advanced Evaluation:* Of the 11 accessions planted for initial evaluation, 6 experienced 100% mortality by November 2004. The 5 surviving accessions were evaluated against one another for important traits on November 11, 2004. Field evaluations were used to define and rank the performance of each accession according to commercially important traits. Accessions were compared to one another by visual estimation, and scored on a scale of 1 to 9. A score of 1 represents superior performance, and a score of 9 represents

**Figure 1. Location of evaluation and collection sites of CHAPARRAL germplasm hairy grama.**



poor performance. Table 3 shows the results of the November 2004 evaluation at Bladerunner Farms.

**Table 3. Evaluation scores of the 5 surviving accessions of hairy grama at Bladerunner Farms, November 11, 2004. 1=best, 9=worst, 2 field reps/accession.**

Accession	9086141	9086154	9088996	9089054	9089152	Mean
<b>Plant Vigor*</b>	2	2.5	2	2	4	2.5
<b>Foliage density</b>	2	3	3	1	5	2.8
<b>Uniformity</b>	2	1.5	2	2	2	1.9
<b>Development stage</b>	1	1	1	1	1	1
<b>Seed production</b>	1	3.5	4	1	6	3.1
<b>Forage production</b>	3	3	4	3	4	3.4
<b>Plant height</b>	2	2	2	3	4	2.6

\*Plant vigor: overall health and performance, including evidence of tillering, vegetative production, seed production, size

Foliage density: determination of the cover value of each accession, leaf density and growth habit are major considerations

Uniformity: an index of similarity of the individual plants within an accession

Development stage: a numerical value defining the morphologic and phenologic stage of the accession. A value of 1 is given to accessions with ripe seed, a value of 9 to the seedling stage of the plant.

Seed production: estimate of the amount of seed produced by the accession, number and size of seed stalks and spikelets, and spikes/spikelet are taken into account

Forage production: amount of herbaceous matter produced that could be consumed by grazing animals

Plant height: height of the above ground portion of the plant

Seed from each accession was collected on November 11, 2004, and tested for active germination on February 2, 2005. Germination was tested for 15 days (12 hours light @ 85° F, 12 hours dark @ 65° F). Germinated seedlings for each accession were counted daily. All germination occurred on days 3, 4, 5, and 6 after initiation of favorable conditions. No germination was observed past day 7 of the experiment. Table 4 shows the results of the germination test.

**Table 4. Active germination of the 5 surviving accessions of hairy grama seed collected on November 11, 2004, from Bladerunner Farms, Poteet, TX.**

<b>Accession</b>	<b>% active germination</b>
<b>9089141</b>	2.00
<b>9086154</b>	2.66
<b>9088996</b>	3.33
<b>9089054</b>	10.66
<b>9089152</b>	4.66

In February of 2005, based on field evaluations and germination tests, all 5 surviving accessions from the initial planting at Bladerunner Farms were selected for advanced evaluation at 3 locations in the Rio Grande Plains. Accession 9089152 was determined to have no original seed remaining. Plants were dug from existing plots at Bladerunner Farms and divided to produce enough plants for a small seed increase. However we observed 100% mortality in the divided plants, and without adequate collection information to recollect the accession, it was eliminated from the advanced evaluation. Transplants of the 4 remaining accessions were grown from original seed and planted for evaluation at the Caesar Kleberg Wildlife Research Institute (CKWRI) Wildlife Complex in Kingsville, TX (soil type Victoria clay), TAES Beeville, TX (soil type Clareville sandy clay loam & Parrita sandy clay loam (USDA-SCS, 1979)) and Rio Farms, Monte Alto, TX (soil type Delfina fine sandy loam (USDA-SCS, 1979)) (Figure 1). Plots at Rio Farms and the CKWRI Wildlife Complex were planted in a split plot design (2 replications x 10 plants of each accession). Plots at TAES Beeville were planted in isolated blocks, 900 ft apart, to facilitate use as a seed increase site. All plots were irrigated to ensure establishment and weeded as needed. Plots at TAES Beeville were irrigated all year to facilitate seed production. Plots were evaluated monthly for important traits, and seed was collected when ripe. The initial evaluation plots at Bladerunner Farms were also evaluated on June 2, 2005. Tables 5, 6, 7, and 8 summarize the performance of each accession in 2005 at Rio Farms, TAES-Beeville, CKWRI Wildlife Complex and Bladerunner Farms, respectively. Seed was collected from each evaluation site when ripe in 2005. This seed was tested for active germination in December 2005. Results of the germination tests are given in Table 9.

*Seed Production:* Seed was harvested from small seed increase plots at TAES Beeville monthly, or whenever ripe throughout 2005. Yearly seed production estimates of each accession are given in Table 10.

**Table 5. Evaluation data collected during the 2005 growing season on the 4 accessions of hairy grama planted at Rio Farms (Monte Alto) (1=best, 9=worst).**

Accession	9086141	9086154	9088996	9089054	Mean
Plant vigor	1.83	1.5	1.5	1.58	1.60
Foliage density	1.91	1.5	2.25	2.33	1.99
Uniformity	1.67	1.5	1.25	1.08	1.38
Development stage	1.41	1.83	1	1	1.31
Seed production	3.67	4.5	1.17	1.67	2.76
Forage production	1.83	1.25	2.08	2.08	1.81
Plant height	2.08	1.75	1.41	1.73	1.74

**Table 6. Evaluation data collected during the 2005 growing season on the 4 accessions of hairy grama planted at TAES Beeville (1=best, 9=worst).**

Accession	9086141	9086154	9088996	9089054	Mean
Plant vigor	3	1	3	2	2.25
Foliage density	3	1	3	2	2.25
Uniformity	2	2	3	3	2.5
Development stage	2	2	1	1	1.5
Seed production	x*	x*	5	2	3.5
Forage production	2	2	3	2	2.25
Plant height	2	2	2	2	2

\* Accessions were not flowering at the time of evaluation

**Table 7. Evaluation data collected during the 2005 growing season on the 4 accessions of hairy grama planted at the CKWRI Wildlife Complex (Kingsville).**

Accession	9086141	9086154	9088996	9089054	Mean
Plant vigor	3	3	3	3	3
Foliage density	1	3	2	4	2.5
Uniformity	1	3	2	2	2
Development stage	1	1	1	1	1
Seed production	2	1	4	3	2.5
Forage production	3	3	3	3	3
Plant height	2	2	2	3	2.25

**Table 8. Evaluation data collected during the 2005 growing season on the 4 accessions of hairy grama planted at Bladerunner Farms (Poteet) (1=best, 9=worst).**

Accession	9086141	9086154	9088996	9089054	Mean
Plant vigor	3	2.5	2.5	3	2.75
Foliage density	2.5	2	3.5	2	2.5
Uniformity	2.5	2	1.5	3	2.25
Development stage	3	3	1.5	2	2.38
Seed production	x*	x*	2.5	x*	2.5
Forage production	2	2	4	3	2.75
Plant height	2	2	2.5	3	2.38

\*evaluated under dry land conditions

**Table 9. Active germination of hairy grama seed collected from evaluation plots in 2005.**

Accession	% active germ. (TAES Beeville)	% active germ. (Rio Farms)	% active germ. (CKWRI WLC)	Mean % active germ/acc
9086141	0.67	1.33	4.67	2.22
9086154	0.00	1.33	0.00	0.44
9088996	2.00	0.00	5.33	2.44
9089054	1.33	11.33	5.33	6.00
Mean % active germ/site	1.00	3.50	3.83	2.78



**Table 10. Yearly seed production estimates of 4 accessions of hairy grama at TAES Beeville, 2005.**

Accession	lbs. seed produced/plant	Est. production lbs./acre/year
9086141	0.00038	16
9086154	0.00291	126
9088996	0.00600	261
9089054	0.01000	435

**Selection criteria for inclusion in release:** All 4 accessions of hairy grama selected for advanced evaluation are recommended for release. All accessions have shown broad adaptability for various soil types, and the original collection locations are representative of the native range of the species throughout South Texas. Two distinct ecotypic varieties of hairy grama are included in this release. Accessions 9086141 & 9086154 are stoloniferous ecotypes. These accessions produce seed year round, but seeds routinely germinate while still attached to the spike. Seed production is highest from September through November; during this period, sprouting seed has not been observed. Accessions 9088996 & 9089054 are more typical ecotypes of hairy grama, given that no stoloniferous growth has been observed and seed is produced throughout the year. All plots will be monitored for long term survival until 2008. Seeding trials for each accession will be conducted at various locations throughout South Texas in 2006. Seed production data will be collected from Foundation Seed Fields, as well as insect and pest identification and control information.

**Current/projected seed availability:** Amounts of seed currently available for increase of 9086141, 9089054, 9086154, and 9088996 is listed in Table 11. This seed was harvested from plots at TAES Beeville from plants grown from the original field seed collections. Seed was harvested throughout 2005, cleaned, and is in cold storage at the PMC. Small quantities of the original field collections are also in storage at the PMC (this seed will not be used for increase due to the small amount remaining). Table 11 estimates the 2006 seed increase. Several years may be necessary to produce large amounts of seed for this release.

**Ecological Considerations and Evaluation:** An Environmental Evaluation of Plant Materials Releases was completed using guidelines established by NRCS (USDA-NRCS, 2000), and the best available information for this species. Results of this evaluation determined that Chaparral Germplasm hairy grama was suitable for release based on the criterion contained in this document. This conclusion is mainly due to the fact that hairy grama is a naturally occurring species in Texas and planting it would therefore not constitute an introduction of an exotic species into local ecosystems. Any negative impacts on other native plant species would likely be minimal to non-existent. Also, release of this species will make available an additional native species for rangeland planting, and may provide unknown benefits by maintaining and contributing habitat that harbors beneficial insects and butterflies

**Table 11. Current/projected seed availability of Selected Plant Material accessions. Seed is currently in cold storage at the PMC, and will be used to grow transplants for Foundation Seed Fields in 2006.**

Accession	lbs. seed (from 2005 Beeville seed increase)	Projected # of plants possible to produce*	2006 projected foundation seed production (bulk lbs.)**
9086141	0.005	960	4.6
9086154	0.035	123.2	0.36
9088996	0.06	26.8	0.0081
9089054	0.12	1,276	10.21

\* Projected number of plants is calculated using active germination of the 2005 Beeville seed increase

\*\* Projected seed production (using seed production amounts calculated from 2005 Beeville seed increase) assumes 80% of production goals are met

**Conservation Use:** Hairy grama has potential for use on highway right of ways, reclamation sites, and in rangeland plantings. It also can be used in many types of conservation plantings, such as stream-side buffers and filter strips.

**Area of adaptation:** The selected accessions were originally collected from sand, loam, and sandy loam soil types in South Texas. Table 12 shows the soil types that the selected accessions have been evaluated on, and acceptable performance has been documented on each soil type. Hairy grama occurs throughout Texas on a wide variety of soil types (Gould, 1975), but is rare in East Texas (Correll & Johnston, 1996). Hatch et al.(1999) reported that it grows best on sandy or sandy loam soils, on well drained sites. Hairy grama is a sub-dominant plant in the little bluestem-trichloris vegetation association (McClendon, 1991). It is found in adobe, stony Ridge, gravelly ridge, loamy sand, and sandy loam range sites in South Texas (NRCS-SCS, 1970). Based on evaluation results and distribution information, 9086141, 9089054, 9086154, and 9088996 should be adapted to the South Texas Plains, Coastal Sand Plains, Gulf Prairies and Marshes, and Edwards Plateau (extreme southern portions) (Figure 1). This selected material will be best adapted to sand, sandy loam, and well drained loamy soils. Additionally, hairy grama occurs in disturbed and undisturbed areas, and is adaptable to various successional stages of many vegetation communities. Adaptation of 9086141, 9089054, 9086154, and 9088996 outside of the area described is unknown

**Availability of Plant Materials:** Foundation seed will be produced and maintained by *South Texas Natives* in conjunction with the Texas Foundation Seed Service. Seed will be produced from transplants grown from original seed or from seed grown at isolated increase plots at TAES Beeville. Each of the 4 accessions must be separated from existing plots of hairy grama and each other by 900 ft. Seed harvested from Foundation Seed Fields will be cleaned and stored at the E. Kika De La Garza Plant Materials Center, in Kingsville, TX. All seed will be tested by outside laboratories for germination, purity, and dormancy.

**Table 12. Soil types of known adaptability for 9086141, 9089054, 9086154, and 9088996 accessions of hairy grama.**

Site/location	Year(s)	Soil Type
Bladerunner Farms (Poteet, TX)	2003-2006	Miguel fine sandy loam
TAES Beeville (Beeville, TX)	2005-2006	Clareville sandy clay loam
TAES Beeville (Beeville, TX)	2005-2006	Parrita sandy clay loam
Rio Farms (Monte Alto, TX)	2005-2006	Delfina fine sandy loam
CKWRI WLC (Kingsville, TX)	2005-2006	Victoria clay

All commercial seed production must take place in Texas. Certified seed fields must be isolated from native or other cultivated stands of hairy grama by 900 ft. Foundation and certified seed fields have a 7 year production limit.

**Figure 2. Photographs of accessions of Selected Plant Material of hairy grama (photographs taken on October 19, 2005 at Rio Farms (Monte Alto)).**



## REFERENCES

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**Prepared by:**

Paula Maywald  
*South Texas Natives*  
MSC 218, Texas A&M-Kingsville  
Kingsville, TX 78363-8202

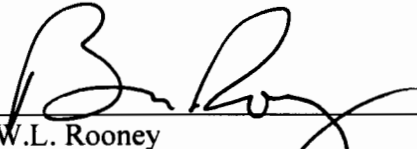
Forrest Smith  
*South Texas Natives*  
MSC 218, Texas A&M-Kingsville  
Kingsville, TX 78363-8202

TEXAS AGRICULTURE EXPERIMENT STATION  
PLANT MATERIAL RELEASE NOTIFICATION  
REPORT OF TECHNICAL COMMITTEE ON SEED RELEASE AND INCREASE

The attached proposal for plant release has been examined and reviewed by members of the TAES plant release committee. Based on this review, the following recommendations regarding release are made. Release procedures followed those given in the TAES Policy on the Management & Release of Plant Materials – 1995.

1. Species: **Hairy grama (*Bouteloua hirsuta*)**
2. Breeders: **William R. Ocumpaugh (TAES contact) et al.**
3. Type of Release: **Selected Native Germplasm**
4. Recommended for Release: **Yes**
5. Designation to be applied upon release: **numerous, see release proposal coversheet**
6. Distribution of Breeder's Seed: **Breeder**
7. Increase and maintenance of Foundation Seed Stocks: **n/a**
8. Responsibility for providing seed to state and federal seed laboratories: **Breeder**
9. Publicity (including Station Seed Leaflet):
10. Other Recommendations:
11. Members of plant review committee considering release: **J. Betran, D. Byrne, J. Starr, G. Peterson, K. Crosby, W. Smith, L. Nelson, and J. Rudd.**

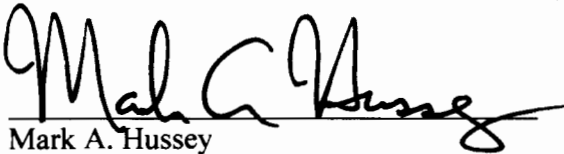
Forwarded by:

  
\_\_\_\_\_  
W.L. Rooney  
Chair, Plant Review Committee

Date: August 18, 2006

Changes in Release: none

Approved as Recommended:

  
\_\_\_\_\_  
Mark A. Hussey  
Associate Director, TAES

Date: **8-21-2006**

**PLANT MATERIALS RELEASE PROPOSAL**

Date: 19 May 2006

1. Crop: **Hairy grama, *Bouteloua hirsuta* Lag.**

Type of Release: **Selected Plant Material**

2. Proposed name or identification: **9086141, 9089054, 9086154, and 9088996 hairy grama**

3. Designation or name in development stages: **4 accession numbers (9086141, 9089054, 9086154, and 9088996)**

4. Primary features or advantages:

- ◆ **Native to and adapted to the South Texas Plains, Gulf Prairies and Marshes, Coastal Sand Plains and Edwards Plateau ecological regions of Texas**
- ◆ **Selected for superior persistence.**
- ◆ **Accessions 9086141 & 9086154 are stoloniferous ecotypes.**
- ◆ **Accessions 9088996 & 9089054 are more typical ecotypes of hairy grama, given that no stoloniferous growth has been observed**

5. Plant Variety Protection: **No**

6. Seed amount available and date: **15 lbs by November 2006**

7. Proposed seed distribution:

Small samples distributed by: **South Texas Natives**

Royalty: **Yes**

8. Provisions: **Seed to be produced in Texas**

9. Suggested fees:

10. Supportive documents attached: **Release Proposal: Yes**

11. Submitted:

Breeders and Scientists – Date

W.R. Coughlin 5-26-06

Unit Heads – Date

Bobby R. Edleman 5-30-06

Signatures for release of:

Chaparral Germplasm hairy grama  
(*Bouteloua hirsuta* Lag.)

Fred C. Bryant

Dr. Fred Bryant, Director  
Caesar Kleberg Wildlife Research Institute  
Texas A&M  
Kingsville, Texas

3/12/07

Date

Malcolm Hesse

Texas Agricultural Experiment Station  
College Station, Texas

4-6-2007

Date

Walter W. Douglas

Walter W. Douglas  
Acting State Conservationist

United States Department of Agriculture  
Natural Resources Conservation Service  
Temple, TX

Acting

4-12-2007

Date

Robert T. Eschman

Robert Eschman  
National Plant Materials Program Leader  
United States Department of Agriculture  
Natural Resources Conservation Service  
Washington, D.C.

4-23-2007

Date