

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 LA SALLE GERmplasm ARIZONA COTTONTOP  
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 Arizona cottontop (*Digitaria californica* (Benth.) Henr.) for the south Texas ecoregion. La Salle Germplasm, accession number 9093398, is a composite of 13 collections that were tested under the following accession numbers: 9088955, 9088857, 9089072, 9090498, 9089189, 9089181, 9090681, 9089086, 9088930, 9090615, 9090619, 9091818, and 9090607.

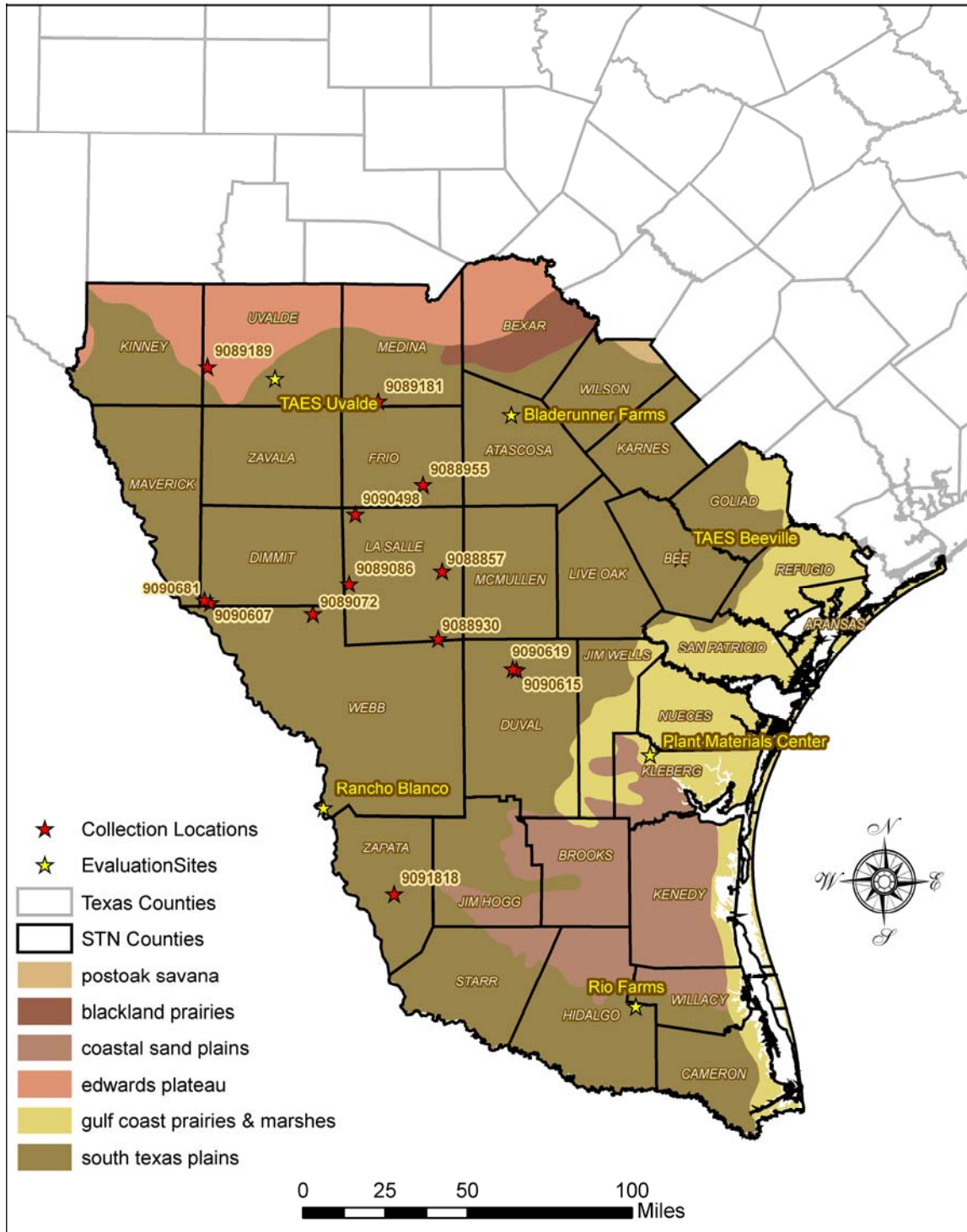
As a selected release, this plant will be referred to as La Salle Germplasm Arizona cottontop. La Salle Germplasm is released as a selected class of certified seed (natural track).

This alternative release procedure is justified because there are no existing Texas commercial sources of tested and adapted Arizona cottontop. The potential for immediate use is high especially in range seeding mixes for restoration and diversification.

**Collection Site Information:** Table 1 shows the origin and collection information of each accession. Each accession is made up of seed obtained from a single wild population of Arizona cottontop (Figure 1). Seed was collected from the wild, cleaned and stored at the E. Kika De La Garza Plant Materials Center (PMC), in Kingsville, TX. Seedlings were grown from these field collections for evaluation.

**Description:** Arizona cottontop is highly self pollinated, in that over half of the florets are self pollinated (Cable, 1979) (Smith et al. 2000). Accessions comprising this release represent 2 kinds of ecotypic variation. Three accessions (9089181, 9089181, and 9091818) have blue-green coloration throughout, and are conspicuously pubescent throughout. All other selected accessions exhibit green coloration, and are considerably less pubescent. This ecotypic variation is genetic and highly heritable. Plants of each type were evaluated for 2 years at 4 locations (4

**Figure 1. Location of evaluation and collection sites of Selected Plant Material of Arizona cottontop.**



**Table 1. Origin and collection information for accessions that make up the Selected Plant Material release of Arizona cottontop.**

Accession	Date	County	Location	Soil type	Collector
9088955	8/21/2002	Frio	Shiner Ranch	Sandy loam	F. Smith & C. Lawson
9088857	7/26/2002	Webb	7 C's Ranch	Loam	F. Smith & C. Lawson
9089072	8/14/2002	Webb	Piloncillo Ranch	Sandy loam	F. Smith & C. Lawson
9090498	5/18/2003	LaSalle	Carrol Road	Sandy loam	F. Smith & C. Lawson
9089189	10/18/2002	Uvalde	Harris Ranch	Loam	F. Smith & C. Lawson
9089181	10/19/2002	Medina	CR 722	Sandy loam	F. Smith, C. Lawson & P. Maywald
9090681	6/26/2003	Dimmitt	San Pedro Ranch	Sandy loam	F. Smith & C. Lawson
9089086	8/12/2002	LaSalle	Chaparral WMA	Sandy loam	F. Smith & C. Lawson
9088930	8/10/2002	LaSalle	7 C's Ranch	Clay loam	F. Smith & C. Lawson
9090615 & 9090619*	7/24/2002	Duval	Welder Ranch	Clay loam	F. Smith, P. Maywald & C. Lawson
9091818**	12/8/2003	Zapata	Arroyo Velano Ranch	Sandy loam	C. Lawson & C. Craft
9090607	6/27/2003	Maverick	Faith Ranch	Sandy loam	F. Smith & C. Lawson

\*Accessions 9090615 & 9090619 were evaluated as separate accessions, but combined because of similarity of collection attributes (same ranch, soil type).

\*\*Accession 9091818 was added because of collection location, and good performance in 1 year of evaluation.

different soil types), and the ecotypic variation was apparent at all locations. Seed was collected from pubescent plant ecotypes and adjacent (2-10 ft distance apart) non-pubescent plants at one location (TAES Uvalde), and planted to determine if the blue green color and pubescence was heritable, or crossed between accessions. More than 250 seedlings were grown from seed produced from 4 different accessions of the non-pubescent ecotype growing adjacent to one of the pubescent ecotypes. No blue-green coloration or conspicuous pubescence was found in any of the seedlings. Fifty seedlings were grown from seed collected from blue-green, pubescent plants at the same location. All 50 of these seedlings exhibited blue-green coloration and pubescence similar to the parent accession. Other than coloration and pubescence noted above, the morphology and phenology of all the accessions included in this release are extremely similar. Seed maturity, initiation of growth in the spring, dormancy (in the fall), seed production, and forage production are all similar among the accessions comprising this release. The general botanical description of Arizona cottontop is: tufted perennial from pubescent knotty bases; culms 35-110 cm long, 1-2 mm thick, erect, sometimes slightly geniculate at the lower nodes, essentially unbranched; ligule a hyaline scale 1-3 mm long; blades 5-18 cm long, 2-5 (-7) mm broad, usually flat or (when very dry) involute; sheaths sparsely to densely pilose; panicle 5-16

cm long, 4-16 (-20) mm thick, usually dense; racemes numerous, 3-7 cm long, ascending or usually appressed; spikelets (not including hairs) 3-4.2 mm long; first glume minute; second glume 3 nerved, densely covered with long silky whitish or purplish hairs that before drying are antrorse and much exceed the spikelet but after drying are widely spreading and fluffy; sterile lemma 3 nerved (actually 5 nerved, another faint pair of nerves discernible along the margins), pubescent like the second glume but with a broad glabrous median stripe between the midnerve and the nearest lateral, this stripe more than half the total breadth of the lemma; fruit 3-3.5 mm long (Correll and Johnston 1996)

**Potential Uses:** La Salle Germplasm Arizona cottontop has high potential for use in rangeland revegetation in South Texas. In New Mexico and Arizona, Arizona cottontop had the best germination of all native forage plants tested. In a study conducted by Cable (1979), populations were maintained by establishment of new plants from seed during wet years, and once established Arizona cottontop is long lived with individual plants persisting up to 15 years even when grazed. Arizona cottontop is one of the easiest native species to establish in Sonoran and Chihuahuan desert environments (Cox et al., 1982). Arizona cottontop is considered a dominant grass on clay and clay loam range sites in South Texas (Gould 1975). “Loetta”, a cultivar of Arizona cottontop released by the Tucson Plant Materials Center was shown to have excellent emergence and establishment in rangeland plantings (USDA et al., 1999). Arizona cottontop occurs throughout southern Texas (Gould 1975) (Correll and Johnston 1996), but no regionally adapted, commercially available seed stock is available for rangeland restoration in South Texas.

Arizona cottontop is recommended for upland wildlife plantings and in range seeding mixes. It can be used in many types of conservation plantings, such as stream-side buffers and filter strips.

### **Method of Breeding and Selection:**

*Collection:* Arizona cottontop was selected for collection by *South Texas Natives* 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* obtained seed from 52 separate field locations from 2001-2003 (Table 2).

*Field Evaluations:* After collection, seeds were assigned accessions numbers, cleaned and stored at the PMC. Based on the distribution of the collections, 31 accessions were chosen for evaluation from 2004-2005. An additional selected accession (PMT-389) from the Knox City PMC was also evaluated against these 31 accessions. Transplants for field evaluation were grown from original seed and transplanted at 3 locations throughout South Texas in the spring of 2004. Locations were: Rancho Blanco near Laredo, TX (soil type La Gloria silt loam (USDA-SCS, 1981)), Rio Farms near Monte Alto, TX (soil type Delfina fine sandy loam (USDA-SCS, 1979), and TAES Uvalde, TX (soil type Uvalde silty clay loam (USDA-SCS, 1970) (Figure 1). Two replications of 10 plants for each of the 32 accessions were planted in a randomized split plot design at each location. Plots at all locations were watered as needed from May-August to insure establishment. Irrigation was discontinued in November of 2004, and all plots were subjected to rain-fed conditions in 2005. Survival of all accessions at all locations was near

**Table 2. Collection information of 52 accessions of Arizona Cottontop obtained by South Texas Natives from 2001-2003.**

Accession	County	Location	Soil type
9085253	Jim Hogg	Hebbronville	Sandy loam
9086263	Zavala	Westwind Ranch	Loam
9088838	Webb	7 C's Ranch	Loam
9088848	Webb	7 C's Ranch	Loam
9088849	Webb	7 C's Ranch	Loam
9088852	Webb	7 C's Ranch	Loam
9088853	Webb	7 C's Ranch	Loam
9088857	Webb	7 C's Ranch	Loam
9088890	Dimmit	Piloncillo Ranch	Sandy loam
9088895	Dimmit	Piloncillo Ranch	Loam
9088918	Dimmit	Piloncillo Ranch	Loam
9088930	LaSalle	7 C's Ranch	Clay loam
9088953	Frio	Shiner Ranch	Sandy loam
9088955	Frio	Shiner Ranch	Sandy loam
9088957	Frio	Shiner Ranch	Sandy loam
9089048	Dimmit	Chaparral WMA	Sandy loam
9089066	Uvalde	HWY 90	Loam
9089072	Webb	Piloncillo Ranch	Sandy loam
9089075	Dimmit	Piloncillo Ranch	Loam
9089084	Webb	Cerrito Prieto Ranch	Sandy loam
9089085	Webb	Cerrito Prieto Ranch	Sandy loam
9089086	LaSalle	Chaparral WMA	Sandy loam
9089181	Medina	CR 722	Sandy loam
9089189	Medina	Harris Ranch	Loam
9089213	Medina	Coyote Ranch	Loam
9090498	LaSalle	Carrol Road	Sandy loam
9090575	LaSalle	Falsettee Ranch	Clay loam
9090576	Frio	Mixed	Mixed
9090597	Maverick	Faith Ranch	Loam
9090607	Maverick	Faith Ranch	Sandy loam
9090615	Duval	Welder Ranch	Clay loam
9090619	Duval	Welder Ranch	Clay loam
9090630	Dimmit	Piloncillo Ranch	Sandy loam
9090643	Dimmit	San Pedro Ranch	Sandy loam
9090657	Dimmit	San Pedro Ranch	Sandy loam
9090662	Maverick	Faith Ranch	Loam
9090663	Maverick	Faith Ranch	Loam
9090667	Dimmit	San Pedro Ranch	Sandy loam
9090681	Dimmit	San Pedro Ranch	Sandy loam
9090688	Dimmit	San Pedro Ranch	Sandy loam
9090719	Frio	Calvert Ranch	Sandy clay
9090722	Frio	Calvert Ranch	Sandy loam
9091818	Zapata	Arroyo Velano Ranch	Sandy loam
9091849	Zapata	Noser Ranch	Clay loam
9091850	Zapata	Noser Ranch	Clay loam
9091860	Zapata	Rancho Dolores	Sandy loam
9091891	Maverick	Comanche Ranch	Gravelly clay
9091898	Dimmitt	La Bandera Ranch	Sand
9093182	Duval	Duval County Ranch	Clay loam
9093186	Dimmitt	La Bandera Ranch	Silty clay
9093191	Jim Hogg	Palangana Ranch	Sandy loam
9093200	Frio	Horse Creek Ranch	Loam/sand
9093211	Webb	Corazon Ranch	Sandy loam

100% over the two year evaluation period. Plots at Rancho Blanco, Rio Farms and TAES Uvalde were evaluated for important traits monthly throughout 2004 and 2005. 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 poor performance.

Tables 3, 4, and 5 summarize the evaluation of the 32 accessions of Arizona cottontop at Rancho Blanco, Rio Farms, and TAES Uvalde. Fifty plants of each accession were also planted for initial evaluation at the PMC (Kingsville, TX, soil type Victoria clay). Limited evaluation data was collected (2 observations) from 2004-2005 on this planting. Because of the relatively small amount of evaluation data available, field observations at the PMC were not used for selection purposes. Additionally, germination data from seed collected in 2004 are presented (Table 6), but also not used for selection. Data from these plots will be used for long term evaluation.

*Germination Tests:* Seed was collected when ripe from each accession from May 2004-November 2005. Seed collected in 2004 was produced under irrigated conditions and tested for germination in March 2005. Seed collected from February-November 2005 was produced under rain-fed conditions and tested for germination in January 2006. Seed was stored at room temperature for at least 10 weeks to allow for after ripening (Gatica 1995). Table 6 shows the active germination results of the 31 accessions of Arizona cottontop from irrigated and non-irrigated plots. Germination tests were conducted on 150 seeds (3 reps x 50 seeds/accession) (12 hrs. dark @ 65° F, 12 hrs. light @ 85° F). Germinated seedlings were counted daily for 30 days. Seed from Arizona cottontop germinates rapidly after initiation of favorable conditions. In the 2005 germination tests, 93% of the observed germination occurred on days 3-5 of the experiment. Highest active germination in both 2004 and 2005 was observed in seed collected from plots at TAES Uvalde. In 2004, seed collected at TAES Uvalde had more than 26% higher germination than any other site. In 2005, seed collected at Uvalde was less than 3 % higher than any other site. Mean germination of all accessions combined over the 2 year period was 61%. This is the highest average active germination observed by South Texas Natives in a native grass species to date. Mean germination was higher in 2005 (72%) than 2004 (56%) at all sites. Increased plant establishment and favorable climatic conditions likely contributed to the higher observed germination in 2005. However, 2005 has been noted as being a poor seed production year in South Texas for many native species, because of record high temperatures, and very low rainfall in many areas. Rainfall at Rio Farms in 2005 was well above average, while Rancho Blanco and TAES Uvalde had below average rainfall in 2005. We suspect that seed germination may be even higher when grown under intensive input conditions in commercial seed production.

*Seed dormancy:* Two accessions of Arizona cottontop were used in an experiment to test germination substrates. Tetrazolium tests (TZ) of these 2 accessions were conducted. TZ test results showed 5 and 18% dormancy on the 2 accessions of Arizona cottontop. Dormancy tests on a 31 accession composite grown at Bladerunner Farms (Poteet, TX) in 2003 showed 28% seed dormancy.

**Table 3. Evaluation data collected during the 2004 and 2005 growing seasons on 32 accessions of Arizona cottontop planted at Ranch Blanco (Laredo). (1 = best, 9 = worst)**

Accession	Plant Vigor*	Foliage Density	Uniformity	Development Stage	Seed production	Forage production	Plant Height	Drought tolerance
9090663	2.8	2.6	2.6	1.7	2.9	2.6	2.6	4.0
9088895	3.2	3.4	2.9	1.8	2.9	3.6	3.0	3.5
9090597	2.9	3.1	3.3	1.9	3.1	3.0	3.1	4.0
9085253	3.3	3.6	3.5	1.9	3.4	3.8	3.5	6.0
9088849	2.9	3.1	2.6	1.7	3.4	3.1	2.9	4.0
9090643	3.3	3.1	2.9	1.8	3.1	3.2	3.4	4.0
9090662	3.6	3.8	3.5	2.1	3.8	4.1	3.6	5.0
9088957	2.7	3.0	2.4	1.7	3.6	3.0	2.9	3.5
9090575	2.6	2.8	2.6	1.6	3.0	2.6	2.8	4.0
9088955	2.5	2.4	2.3	1.7	2.9	2.9	2.7	5.0
9088953	2.7	2.9	2.3	1.6	3.0	2.9	2.7	4.5
9086263	2.8	2.9	2.8	1.7	2.9	2.9	2.8	4.0
9088857	2.2	1.9	2.0	1.6	2.5	1.9	1.9	3.5
9088852	2.6	2.9	3.0	1.8	3.1	2.8	2.8	4.0
9089084	2.7	2.8	3.1	1.7	3.0	2.9	3.0	4.5
9089072	2.6	2.7	2.1	1.7	2.8	2.4	2.4	4.0
9090619	2.7	2.4	2.4	1.8	3.0	2.6	2.5	4.5
9088848	3.3	3.4	2.5	1.7	3.3	3.4	3.2	5.5
9089095	3.0	3.3	3.6	1.8	3.2	3.4	2.9	4.5
9090498	2.4	2.6	2.1	1.6	2.9	2.4	2.3	4.0
9088890	2.6	2.6	2.5	1.7	2.9	2.6	2.4	3.0
9089189	2.6	2.7	1.8	1.9	2.9	2.6	2.6	5.0
9088838	2.8	2.8	2.3	1.7	2.8	2.8	2.5	3.5
9089181	2.4	2.2	1.9	1.6	2.6	2.1	2.3	3.0
9090681	2.6	2.8	2.6	1.8	2.8	2.6	2.5	4.0
9090607	2.8	2.7	2.7	1.7	2.8	2.8	2.6	3.0
9089086	2.6	2.9	2.5	1.7	3.4	2.7	2.6	3.3
9088930	2.6	2.7	2.4	1.7	2.9	2.6	2.6	5.0
9088853	3.1	3.3	3.0	1.7	3.1	3.3	3.0	4.5
9088918	2.6	2.8	2.3	1.6	3.1	2.9	2.9	5.0
9090615	2.1	1.9	1.8	1.8	2.4	1.8	1.9	4.0
PMT-389	3.6	2.8	2.5	1.3	3.9	3.2	2.7	4.0

\* 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

**Table 4. Evaluation data collected during the 2004 and 2005 growing seasons on 32 accessions of Arizona cottontop planted at Rio Farms (Monte Alto). (1 = best, 9 = worst)**

Accession	Plant Vigor	Foliage Density	Uniformity	Development Stage	Seed production	Forage production	Plant Height
9090663	2.3	2.1	2.0	1.3	2.6	2.2	1.9
9088895	2.7	2.6	2.4	1.1	2.7	2.9	2.1
9090597	2.6	2.6	2.2	1.4	3.4	2.9	2.3
9085253	3.0	3.1	2.7	1.4	3.3	3.1	2.9
9088849	2.8	3.1	2.7	1.3	3.0	3.0	2.7
9090643	2.8	2.8	2.5	1.2	3.5	2.8	2.5
9090662	3.5	3.6	3.4	1.9	3.4	3.3	2.9
9088957	3.3	3.3	3.2	1.5	3.6	3.2	2.9
9090575	3.1	2.8	2.9	1.4	3.0	3.2	2.7
9088955	2.8	2.6	2.0	1.1	2.9	2.8	2.3
9088953	2.7	2.6	2.1	1.2	3.0	2.7	2.3
9086263	2.7	2.7	2.3	1.1	2.7	2.7	2.5
9088857	2.5	2.6	2.1	1.1	2.6	2.2	2.1
9088852	2.9	2.9	2.9	1.4	2.8	3.1	2.7
9089084	2.7	2.7	2.1	1.3	2.9	2.8	2.4
9089072	2.6	2.4	2.2	1.2	2.9	2.6	2.4
9090619	2.8	3.0	2.4	1.2	3.0	2.9	2.4
9088848	2.7	2.5	2.6	1.3	2.9	2.6	2.4
9089095	2.7	2.6	2.4	1.3	2.7	2.8	2.6
9090498	2.9	2.7	2.4	1.2	2.7	2.9	2.4
9088890	2.9	3.3	2.4	1.2	2.7	3.1	2.5
9089189	3.0	2.5	2.0	1.2	2.8	2.7	2.4
9088838	2.7	2.6	2.4	1.1	2.9	2.6	2.3
9089181	2.6	2.4	2.1	1.2	2.4	2.2	1.9
9090681	2.4	2.6	2.5	1.3	2.4	2.6	2.1
9090607	2.6	2.7	2.1	1.1	2.5	2.8	2.1
9089086	2.2	2.4	2.3	1.4	2.8	2.5	2.2
9088930	2.0	2.2	1.7	1.1	1.9	1.9	1.9
9088853	2.2	2.0	2.4	1.3	2.1	2.1	2.0
9088918	2.8	2.4	2.4	1.2	3.1	2.8	2.4
9090615	2.4	2.4	2.2	1.1	2.9	2.4	2.0
Knox City	2.3	2.3	2.0	1.0	2.4	2.5	1.8



**Table 5. Evaluation data collected during the 2004 and 2005 growing seasons on 32 accessions of Arizona cottontop planted at TAES Uvalde. (1 = best, 9 = worst)**

Accession	Plant Vigor	Foliage Density	Uniformity	Development Stage	Seed production	Forage production	Plant Height
9090663	2.6	2.6	2.4	1.9	2.9	2.7	2.5
9088895	2.6	2.5	2.5	1.8	2.2	2.6	2.3
9090597	2.6	2.6	2.1	1.8	2.7	2.7	2.3
9085253	2.3	2.0	1.9	1.9	2.2	2.1	1.9
9088849	2.8	3.1	2.6	1.8	3.0	2.9	2.4
9090643	2.6	2.5	2.4	1.9	2.9	2.8	2.3
9090662	3.3	3.2	4.1	1.9	3.2	3.1	2.8
9088957	2.9	2.8	2.8	2.0	3.3	2.9	2.7
9090575	2.9	2.9	2.7	2.0	3.5	2.9	2.7
9088955	2.1	1.9	1.8	1.9	2.1	2.3	1.8
9088953	2.8	2.6	2.6	1.8	3.0	2.6	2.5
9086263	2.6	2.5	2.1	1.8	2.7	2.6	2.3
9088857	2.1	2.6	2.2	1.8	2.0	2.3	1.9
9088852	2.7	3.0	2.6	1.9	2.9	2.8	2.1
9089084	2.6	2.8	1.8	1.8	2.4	2.8	2.3
9089072	2.6	2.6	1.9	1.9	2.7	2.4	2.1
9090619	2.5	2.6	2.3	1.9	2.7	2.6	2.1
9088848	2.6	2.5	2.2	1.9	2.9	2.5	2.5
9089095	3.6	3.8	3.4	1.9	4.3	4.1	3.4
9090498	2.3	2.6	2.3	1.8	2.8	2.8	2.2
9088890	3.1	3.2	2.7	1.9	3.2	3.1	2.8
9089189	2.4	2.5	1.9	1.8	2.3	2.6	2.4
9088838	2.8	2.6	2.6	1.9	2.8	2.9	2.4
9089181	2.4	2.6	2.3	1.9	3.0	2.4	2.4
9090681	2.5	2.6	2.1	1.8	2.6	2.6	2.2
9090607	2.9	2.8	2.6	1.9	3.2	3.1	2.8
9089086	2.4	2.2	2.2	1.8	2.6	2.3	2.2
9088930	2.6	2.8	2.3	1.9	3.1	2.8	2.5
9088853	2.6	2.6	2.5	1.9	3.1	2.8	2.2
9088918	2.8	2.7	2.4	1.9	2.6	2.7	2.5
9090615	2.1	1.9	2.3	1.8	2.4	2.0	2.2
PMT-389	2.9	2.6	2.4	1.8	2.8	3.5	3.3

**Table 6. Germination of 31 accessions of Arizona Cottontop in 2004 (irrigated) and 2005 (non-irrigated) grown at 3 locations in South Texas.**

Accession	TAES-U	Rio Farms	Rancho Blanco	PMC	2004 Mean	TAES-U	Rio Farms	Rancho Blanco	2005 Mean	2 year mean
9090663	65	46	23	13	37	83	72	72	76	56
9088895	77	18	45	23	40	77	70	67	71	56
9090597	87	28	36	no seed	50	72	69	64	68	59
9085253	66	42	41	40	47	70	71	60	67	57
9088849	64	63	27	45	50	75	79	59	71	60
9090643	89	81	28	8	51	76	80	57	71	61
9090662	69	72	25	7	43	79	69	61	70	56
9088957	73	45	40	26	46	78	59	65	67	56
9090575	75	28	40	18	40	79	54	72	68	54
9088955	88	70	26	26	52	62	59	75	65	59
9088953	66	48	53	36	51	70	72	76	73	62
9086263	75	62	51	15	51	75	78	71	74	63
9088857	94	53	44	10	50	89	86	67	81	65
9088852	58	32	22	18	32	88	82	69	80	56
9089084	93	67	65	40	66	80	84	69	78	72
9089072	83	61	50	56	62	78	83	75	78	70
9090619	87	31	38	40	49	73	77	73	74	62
9088848	85	46	33	no seed	54	80	81	72	78	66
9089095	66	52	40	43	50	84	77	63	74	62
9090498	89	59	55	53	64	70	75	55	67	65
9088890	75	33	52	44	51	66	69	61	66	58
9089189	53	56	11	25	36	64	73	65	67	52
9088838	43	62	44	40	47	82	84	62	76	61
9089181	72	52	19	18	40	85	85	60	76	58
9090681	80	60	29	31	50	89	89	59	79	64
9090607	87	51	41	66	61	87	81	71	80	70
9089086	96	44	54	57	63	86	73	61	74	68
9088930	88	66	42	61	64	81	70	61	71	67
9088853	84	44	45	32	51	81	72	57	70	61
9088918	90	45	55	43	58	75	64	41	60	59
9090615	86	61	38	26	53	72	55	19	49	51
Means	77	51	39	33	50 (56 not including PMC)	78	74	63	72	61

*Seed harvest and storage:* Seed was harvested with a Flail-vac seed stripper @ 200-1000 rpm. Harvest at 400-1000 rpm removes all seed heads, including large amounts of green seed, which significantly reduces purity of the harvest. We found that stands that can be harvested multiple times should be harvested at 200-400 rpm. After-ripening of Arizona cottontop is recommended for obtaining maximum germination. Gatica (1995) reported that storage for 10 weeks at ambient temperatures resulted in best seed germination. Cold storage at 39° F is recommended following after ripening.

*Seed cleaning/Seed coating:* The Tucson PMC recommends cleaning of “Loetta” Arizona cottontop with a Westrup Laboratory Brush Huller/Scarifier to remove the hairs from the glumes. After this treatment, the seed is processed through a dual screen air separator using a #8 top screen and a # 1/23 bottom screen. The hairs are removed for easier storage and to allow the seed to flow through drill tubes when seeding (USDA et al., 1999). Research by Gatica (1995) has shown that the glume and lemma surrounding the caryopsis of Arizona cottontop slows germination. Another option for making Arizona cottontop easier to plant is to coat the seed with a talc or lime-based coating. Active germination of Arizona cottontop was reduced by only 2 % (68 % uncoated, 66 % coated) when coated for use in a seeding trial; seed dormancy of the same seedlot was reduced 10 % by coating. In our experiments coating Arizona cottontop was shown to have no effect on active seed germination in field or laboratory tests, or plant establishment after 30 days. In seedling emergence trails at the Kingsville PMC in 2004, emergence of Arizona cottontop seedlings was not inhibited by coating the seed (NRCS 2005).

*Seed production:* Evaluation plots at Rancho Blanco (Laredo, TX) were harvested with a Flail-vac seed stripper in the summer of 2005 to estimate seed production of Arizona cottontop. Seed production was estimated at 142 lbs. of seed/acre and 63 lbs pure live seed (PLS)/acre. Table 7 shows the results of the seed harvest.

**Table 7. Seed production of 31 accessions of Arizona cottontop at Rancho Blanco (Laredo), harvested in June and July 2005. Plots were under rain fed conditions.**

Seed production (bulk lbs./acre/harvest)	Seed production (lbs PLS/acre/harvest)	Seed production (lbs PLS/plant)	% active germination	% PLS	% purity
142	63	0.0015	56	44.8	80

*Seeding trials:* One seeding trial was initiated in the fall of 2005, a planting in conjunction with a herbicide tolerance study at the Welder Wildlife Refuge near Sinton, TX. Four 10’ x 10’ plots were seeded at 1.33 lbs PLS/acre. Three of the four plots were treated with pre-emergent herbicides (Plateau (Imazapic) @ 3 oz/acre, Plateau @ 6 oz/acre, and Stalker (Imazapyr) @ 12 oz/acre); one plot was used as a control. Plots were seeded in October 2005. Plots will be monitored in 2006 for stand establishment and resistance to each herbicide. In another trial seed from a South Texas composite collection (coated and non-coated), and PMT-389 (Knox City selection) of Arizona cottontop were planted (3 replications of 10’ x 20’ plots, seeded at 20 PLS/ft<sup>2</sup>) at the Kingsville PMC in May 2004 for observation of seedling emergence. The South

Texas composite collection (coated and non-coated) showed greater emergence and higher seedling density than PMT-389 in November 2004. Additional data will be collected on this planting from 2005-2006 (NRCS 2005). Additional rangeland seeding trials are planned for 2006 at various locations (Uvalde, Webb, Frio, Duval, and Hidalgo counties) throughout South Texas.

**Criteria for inclusion in release:** Selection of accessions to be included in this release was based on 2004-2005 evaluation data and germination test results from Rancho Blanco, Rio Farms, and TAES Uvalde. Evaluation data was compared by site, with equal weight given to each evaluation category. Germination data was also compared by site over the evaluation period. Accessions were selected that had superior mean performance in the greatest number of categories (evaluation at each site, germination of seed from each site = 6 total possible categories). Sixteen of the 31 evaluated accessions had greater than mean performance in 4 or more categories. Of these 16, 3 accessions (9088838, 9088848, and 9089084) were eliminated because they had the same collection attributes as higher ranking accessions (same collection location, county and or soil type). One accession (9086263) was eliminated because no original seed was remaining. Two accessions (9090615 & 9090619) were combined because of similar performance and collection attributes (both originated from the same ranch and soil type, and were collected on the same date). The total number of selected accessions from this evaluation was 11 (Table 8). Seed stock of the release originates from 9 South Texas counties, and represents a variety of soil types. Average germination of the 11 accessions comprising this release (4 sites over 2 years) was 63 %. Three additional accessions were planted for evaluation in 2005. These accessions originated from areas not represented by the accessions evaluated in 2004-2005 evaluation.

**Current/projected seed availability:** Small quantities of the original seed collections of each accession selected for release are in storage at the E. Kika De La Garza PMC. This seed was used to grow transplants (+/- 1500) of each accession in January 2006. These transplants were planted at Rio Farms (Monte Alto, TX) for use as foundation seed fields in March 2006. Seed will be harvested when ripe throughout 2006. Based on previous performance of Arizona cottontop at Rio Farms, 5 seed harvests are estimated in 2006. Estimated seed production of each of the 12 accessions is 24.75 lbs. (1500 plants \* 0.0033 lbs. seed./plant/harvest \* 5 seed harvests in 2006 = 24.75 lbs. seed/accession). This will result in an estimated total seed production from all accessions of about 300 lbs.

**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 La Salle Germplasm Arizona cottontop was suitable for release based on the criterion contained in this document. This conclusion is mainly due to the fact that Arizona cottontop 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

**Table 8. Selection chart for selected plant material of Arizona cottontop.**

Accession	County	Location	Soil type	Number of categories with >mean performance	Selection decision
9088857	Webb	7 C's Ranch	Loam	6	Included
9089072	Webb	Piloncillo Ranch	Sandy loam	6	Included
9088930	LaSalle	7 C's Ranch	Clay loam	5	Included
9089086	LaSalle	Chaparral WMA	Sandy loam	5	Included
9089181	Medina	CR 722	Sandy loam	5	Included
9090498	LaSalle	Carrol Road	Sandy loam	5	Included
9090607	Maverick	Faith Ranch	Sandy loam	5	Included
9090681	Dimmit	San Pedro Ranch	Sandy loam	5	Included
9086263	Zavala	Westwind Ranch	Loam	4	No original seed-delete
9088838	Webb	7 C's Ranch	Loam	4	Already selected same attributes-delete
9088848	Webb	7 C's Ranch	Loam	4	Already selected same attributes-delete
9088955	Frio	Shiner Ranch	Sandy loam	4	Included
9089084	Webb	Cerrito Prieto Ranch	Sandy loam	4	Already selected same attributes-delete
9089189	Uvalde	Harris Ranch	Loam	4	Included
9090615	Duval	Welder Ranch	Clay loam	4	Combined with 9090619
9090619	Duval	Welder Ranch	Clay loam	4	Combined with 9090615
9091818*	Zapata	Arroyo Velano Ranch	Sandy loam	*	Increased for evaluation against others

\*Accession 9091818 has been evaluated separately for one year, but shown promise, it will be evaluated against the other 11 selections in the seed increase process.

native species for rangeland planting, will provide a good seed source for quail and other birds and may provide unknown benefits by maintaining and contributing habitat that harbors beneficial insects and butterflies.

**Conservation Use:** Forage value of Arizona cottontop is fair for livestock, and poor for wildlife in the Gulf Prairies and Marshes of Texas (Hatch et. al. 1999). Gould (1979) reports that grazing value is good for livestock and fair for wildlife. High palatability ratings have been given to Arizona cottontop (Bedunah and Sosbee, 1984). It is palatable throughout the year (Gould 1979), and is preferred by livestock over most other grass species at all seasons of the year (Cable 1979). Seed longevity of Arizona cottontop has been found to be good for up to three years following harvest (>80%). Germination then declines about 6 % per year for the next 12-14 years (Tiedmann and Pond 1967). Arizona cottontop contains approximately 653,000 seeds per pound.

**Area of Adaptation:** Accessions comprising this release were originally collected from loam, sandy loam and clay loam soil types. Table 9 shows the soil types that these selected accessions have been planted or evaluated on. Arizona cottontop occurs in the Gulf Prairies and Marshes, Blackland Prairies, Cross Timbers and Prairies, South Texas Plains, Edwards Plateau, Rolling Plains, High Plains, and Trans-Pecos Mountains and Basins vegetational areas of Texas. It ranges from Colorado to Texas to Arizona and northern Mexico (Gould 1975). It is found growing on open well-drained sites (Gould 1978), in clay loam, sandy loam, and loose gravelly soils, as well as limestone ledges and porphyritic hills. It is more abundant and productive on clay, sand or sandy loam subsoils than on shallow, stony or cobbly soils (Cable 1979). Based on our evaluation results, distribution information, and the original distribution of the collections comprising the release, these accessions should be adapted to the South Texas Plains, Coastal Sand Plains, Gulf Prairies and Marshes, and Edwards Plateau (southern portions) (Figure 1).

Arizona cottontop ranges from an early successional to climax species dependant upon the range site, soil type, and region considered. Across most of the recommended planting area, Arizona cottontop is a climax decreaser species on sandy loam soils and an increaser on heavy textured soils. Adaptation of this release is unknown outside of the area described.

**Table 9. Soil types of known adaptability of Selected Plant Material of Arizona Cottontop.**

Site/location	Year(s)	Soil Type	Performance
Bladerunner Farms (Poteet, TX)	2003-2006	Miguel fine sandy loam	Excellent year 1, declined thereafter
TAES-Uvalde (Uvalde, TX)	2004-2006	Uvalde silty clay loam	Excellent
Rio Farms (Monte Alto, TX)	2004-2006	Delfina fine sandy loam	Excellent
Rancho Blanco (Laredo, TX)	2004-2006	La Gloria silt loam	Excellent
Kingsville PMC (Kingsville, TX)	2004-2006	Victoria clay	Moderate

**Availability of Plant Materials:** Foundation seed will be produced and maintained by *South Texas Natives* in conjunction with Texas Foundation Seed Service. Seed will be produced from transplants grown from original seed. Each accession must be separated from existing plots of Arizona cottontop, and each other by 900 ft. Seed harvested from Foundation Seed Fields will be cleaned and stored at the PMC, in Kingsville, TX. All seed will be tested by outside laboratories for germination, purity, and dormancy.

All commercial seed production must take place in Texas. All certified seed fields must be isolated from native or other cultivated stands of Arizona cottontop by 900 ft. Foundation and certified seed fields will be limited to 7 production years.

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- USDA-SCS. 1981. Soil Survey of Webb County, Texas. United States Department of Agriculture, Washington, D.C.

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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: **Arizona Cottontop (*Digitaria californica*)**
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.**

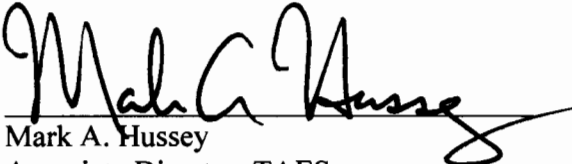
Forwarded by:

  
\_\_\_\_\_  
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: **Arizona Cottontop, *Digitaria californica* (Benth.) Henr.**  
Type of Release: **Selected Plant Material**
  
2. Proposed name or identification: **9088955, 9088857, 9089072, 9090498, 9089189, 9089181, 9090681, 9089086, 9088930, 9090615, 9090619, 9091818, and 9090607 Arizona cottontop**
  
3. Designation or name in development stages: **13 accession numbers (9088955, 9088857, 9089072, 9090498, 9089189, 9089181, 9090681, 9089086, 9088930, 9090615, 9090619, 9091818, and 9090607).**
  
4. Primary features or advantages:
  - ◆ **Native to and adapted to southern Texas**
  - ◆ **Rapid germination (93% of active germination occurs within 3-5 days of favorable conditions) and growth rate (20 days from dormancy to seed maturity)**
  - ◆ **Superior adaptability compared to the commercial line from New Mexico (PMT 389).**
  - ◆ **High active germination (average 63%)**
  
5. Plant Variety Protection: **No**
  
6. Seed amount available and date: **300 lbs by November 2006**
  
7. Proposed seed distribution:

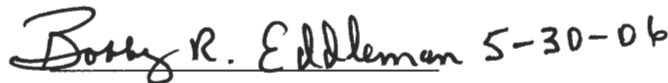
Small samples distributed by: **South Texas Natives**

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

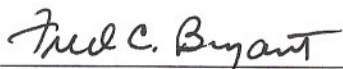
 5-26-06

Unit Heads – Date

 5-30-06

Signatures for release of:

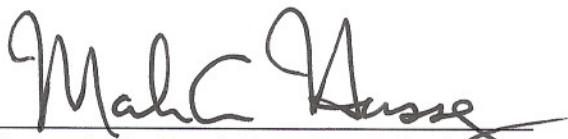
La Salle Germplasm Arizona cottontop  
(*Digitaria californica*) (Benth.) Henr.



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

3/12/07

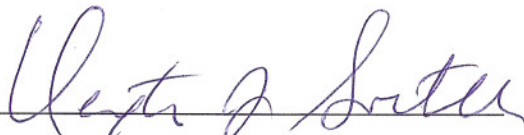
Date



Texas Agricultural Experiment Station  
College Station, Texas

4-6-2007

Date

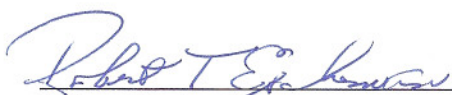


Walter W. Douglas  
Acting State Conservationist  
United States Department of Agriculture  
Natural Resources Conservation Service  
Temple, TX

Acting

4-12-2007

Date



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

4-23-2007

Date