

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Plant Science Division
Washington, D. C.

and

ARIZONA AGRICULTURAL EXPERIMENT STATION
Tucson, Arizona

Notice of Release of 'CORTO' Australian saltbush for Soil
Stabilization and Cover.

The United States Department of Agriculture, Soil
Conservation **Service**, and the **Arizona** Agricultural
Experiment Station announce the naming and release
of 'CORTO' Australian saltbush (*Atriplex semibaccata*
R. Br.).

Australian saltbush is a semi-herbaceous *Atriplex*
species native to Australia. It was introduced
into California through the **California** Agricultural
Experiment Station, University of California, in
the **late** 1800's, and has become naturalized in
southern California, **Arizona** and New Mexico. In
Arizona, plants are found in Graham, Cochise,
Maricopa, Pima and Yuma counties at elevations
between 1,000 and 3,000 feet, growing where extra
run-in moisture is available. **Australian** saltbush
is a drought tolerant, rapidly developing plant
and a good reseed.

Description

'CORTO' is a low-growing, spreading, semiprostrate plant, 8-10 inches tall. Stems become somewhat woody, but it is primarily herbaceous. Leaves are numerous, gray-green in color, oblong with smooth or slightly toothed edges, 1/2 to 1 inch long and usually 1/8" to 1/4" wide. Leaves are usually narrower toward the upper ends of the branches.

Australian saltbush is a monoecious plant having inconspicuous staminate flowers in terminal glomerules and pistillate solitary flowers, or a few together, located in the upper leaf axils. Flowering is indeterminant. The Australians believe the plants are anemophilous (3) (normally wind pollinated) but bagged plants produced seed by self-pollination. Fruiting bracts are somewhat fleshy and mature reddish from October through December.

Procedures Used in Development

Three accessions were selected from initial evaluations of 8 *Atriplex semibaccatas* at the Tucson Plant Materials Center: 'CORTO' for low growth and drought tolerance; P-15654 for seedling vigor; A-17852 for cold tolerance and low growth. From advance testing, 'CORTO' appears to have the best combination of desirable characteristics, the widest area of adaptation for use as an erosion-control cover plant, and the most uniform growth habit for beautification. There is a strong demand for this plant on mine spoils, road right-of-ways and similar disturbed sites. The plant has also been used extensively for landscaping.

Origin

'CORTO' was collected one mile west of Safford, Arizona in 1967 by Louis Hamilton and tested under the following accession numbers: P-15653 and A-17278.

Adaptation

'CORTO' is drought and alkali tolerant. Plants provide good cover with an annual precipitation of 10-12 inches or on areas receiving run-in moisture, such as roadsides and drainage ways. Supplemental irrigation is needed to maintain good stands in lower precipitation areas, but some irrigation is often necessary to assure initial stand establishment. Hardiness limits have been established at about 3,500 ft. elevation. Plants, especially older plants, are killed back to the ground at Tucson with minimum temperatures below 25°F., but the plants recover in the spring. At Tucson, 'CORTO' has recovered from 17°F. "burn" back. It is probable that these plants would be permanently damaged from temperatures at 10°F. or lower, although they may reestablish from seed on such sites. Australian saltbush is adapted to light and medium textured soils.

Suggested Uses

Australian saltbush is adapted for use as a ground cover for erosion control and beautification on road banks, ditch banks, mine spoils and **similar** disturbed sites. **It is well** adapted for landscaping around suburban homesites and buildings and has been tested in California as a fire resistant plant for fire-breaks. It should not be used on areas subjected to foot traffic because it cannot withstand trampling.

Australian saltbush grazing studies have been conducted for fifty years in California (4), and Australian saltbush wits reported to be a good forage plant for horses, cattle, and sheep (2). Results of analysis shows the amounts of digestible nutrients compares well to alfalfa, (Table 6).

Australian saltbush plants often contain oxalate in potentially toxic amounts (soluble oxalates from 0.6% to 7.5%; total oxalates from 1.99 to 10.0%). However, in the field, animals do not normally eat the young succulent leaves, but prefer to wait until they are drying off before grazing them (Everist, Poisonous Plants of **Australia**, 1974, p. 105). This toxicity potential is about the same as for *Enchylaena tomentosa*, which yielded 6.5% to 6.7% oxalic acid. Despite this high level of oxalate, no definite cases of livestock poisoning have been recorded. (See Everist, 1. c. P 133)

Culture and Management

Australian saltbush has approximately 246,000 seeds per pound. Seeding rate should be 7 pounds per acre pure live seed (pls) - 40 seed/ft.²

Early fall or early spring planting provides a cool season for the best seed germination. Drilling the seed shallow (less than ¼ inch) into a firm seed bed and compacting the soil around the seed results in good germination. Irrigation increases seed germination and subsequent plant establishment. Plants are short-lived, but persist by reseeding.

Raking-in broadcast seed and hydroseeding have been used successfully on slopes. However, mulch has been beneficial for plant establishment on all these critical areas.

Australian saltbush has shown good response to nitrogen fertilizer and soil sulfur on alkali soils.

With supplemental irrigation, Australian saltbush has been established on mine tailing slopes with pH 7.8 and total soluble salts 2800 parts per million (PPM).

Seed Source

Breeder and Foundation seed will be produced by the SCS Tucson Plant Materials Center, Tucson, Arizona. Recognized generations through which

'CORTO' will be distributed in Breeder, Foundation, and Certified seed classes. Foundation seed will be available to growers through the Arizona Crop Improvement Association and Natural Resource Conservation Districts. Isolation distances for seed certification will be set at 600 ft. for Foundation fields and 300 ft. for certified seed production fields to insure pure seed of open-pollinated plants entered into the ACIA seed certification program. Standards for all classes of seed will be included in the Arizona Seed Certification Handbook.

Seed production potential is listed in Appendix Table 5,

Bibliography

- (1) Robbins, W. W., July 1940. Alien Plants Growing Without Cultivation in California. University of California, College of Agriculture, Agricultural Experiment Station Bulletin 637.
- (2) Shinn, Charles H., May 1899. Australian Saltbushes - Results of Eighteen Year's Tests: Characteristics, Propagation, and Field Experiments. University of California, Agriculture Experiment Station Bulletin 125
- (3) Everist, S.L., 1976. Australian Saltbush pollination and Toxicity, Correspondence from the Director of the Queensland Herbarium.
- (4) University of California Agricultural Experiment Station or by the California Forest and Range Experiment Station between 1930 and 1940. Early History of Australian Saltbushes (*Atriplex* sp.) Introduced Into the United States, 1877 to 1901.

Shinn
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3/8/77
Date

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2-25-77
Date

APPENDIX

INITIAL PLANTINGS AND LIST OF ACCESSIONS TESTED

Table 1

Accession No.	Origin	Planting Date	Seedling Vigor	Stems	Wetness	Remarks
A-26	Aust. 1934	-	-	-	-	
A-774	Tempe, AZ 1934	-	-	-	-	
A-2531	Safford, AZ 1935	-	-	-	-	Produced 2,355 lbs
A-3636	Aust. 1935	-	-	-	-	
A-14448	AZ, 1939	10-53	1	-	-	No evaluation notes
A-11908	Sah V. CA, 1952	10-53	1	-	-	
	Renson, AZ	10-53		-	-	Dried & dormant

Initial Evaluation Planting at Tucson PMC, elevation 2300 feet., MLRA 40D, (irrigated for establishment). Soils - Comoro fine sandy loam. Mean annual precipitation 10.5 inches.

A-14300, BN-7,417 PI 197833	So. Africa, 1952	-	-	-	-	
A-17278, P-15653	Safford, AZ	4-70	1	1	3	
A-17282, P-15654, PI-299488	So. Africa	4-70	1	1	5	
A-17289, PI-3099489	So. Africa	4-70	2	2	4	
	California 1969	4-70	1	1	5	
A-17520, PL-221	California 1969	4-70	1	1	5	
A-17521, PL-292	California 1969	4-70	2	2	3	Cold tolerant.
A-17852	Bisbee, AZ	Sp 71	2	2		

Legend (all ratings on attached tables): 1 = excellent

5 = very poor

ADVANCE TESTING LOCATIONS

Table 2

Tucson FMC Channel Slope, elevation 2300 ft, MLRA 40D, (irrigated for establishment). Mean annual precipitation 10.5 inches. Soils - Comoro fine sandy loam to Grabe loam (subsoil conditions).

Plot	Accession	Seeding Date	North Facing Slope			Remarks
			Eval. Year	Vigor	Stands	
4	'CORTO'	2-69	1969	1	2	Low growth, 8-12" ht. Die back, 73 drought
			1970	1	1	
			1971	1	1	
			1972	2	2	
			1973	2	2	
			1974	3	4	
5	P-15654 & 'CORTO'	2-69	1969	2	2	Poor emergence, ht 16-20", uneven growth. Die back, 73 drought
			1970	2	2	
			1971	2	2	
			1972	3	3	
			1973	2	3	
			1974	4	4	
7	A-17852	3-72	1972	3	3	Ht 8-12"
			1973	3	3	
			1974	3	5	
17	A-17283	11-69	1970	1	2	Frost damage Variable growth.
			1971	2	2	
			1972	3	2	
			1973	2	2	
			1974	4	3	
18	P-15654	11-69	1970	1	2	Ht 16-24" Uneven growth No frost damage Die back,, 73 drought
			1971	2	2	
			1972	2	2	
			1973	3	2	
			1974	4	5	
1	A-17283	3-72	South Facing Slope			Ht 8-12"
			1972	2	2	
			1973	2	1	
2	'CORTO'	3-72	1972	1	1	Ht 8-12"
			1973	1	1	
			1974	2	2	
3	p-1.5654	3-72	1972	2	3	Ht 14-20"
			1973	1	3	
			1974	3	4	
4	A-17852	4-72	1972	3	3	Ht 8-12"
			1973	2	3	
			1974	3	3	

Ratings 1= excellent

5 = very poor

Table 3

Pima Mine Cooperative Field Evaluation Site, elevation 3200 ft, MLRA 40D, average annual ppt is 13.5 inches. The plots were located on tailings, overburden and mixed tailings-overburden material. (pH 7.8 - Total soluble salts 2870 p.p.m.)

Pima Mine Hydromulched Plots Seeded 1-24-72 on mixed tailing

Species	Acc.No.	Seedling Vigor	Stand Ratings (Year)			Remarks
			1st	2nd	3rd	
Enchylaena tomentosa	P-15560	2	4	3	2	Vigor good in older plan
Atriplex semibaccata	'CORTO'	1	2	3	3	Some weeds in old stand.
" "	P-15654	1	2	2	3	" " " " "
" canescens	A-16652	2	3	3	1	Vigor good in older plan

Pima Mine Stubble (overseeded with Lehmanns lovegrass) plots seeded 3-29-71 on mixed tailing

Enchylaena tomentosa	P-15560	2	4	4	4	Grass competition
Atriplex semibaccata	'CORTO'	1	3	2	3	Good vigor
" "	P-15654	1	4	3	2	Uneven growth
" canescens	P-15644	2	4	3	2	
" "	A-16652	2	1	1	2	
" lentiformis	A-17156	2	5	5	2	

Pima Mine - No stubble (overseeded with Lehmanns lovegrass) plots seeded 3-29-71 on mixed tailing

Enchylaens tomentosa	P-15560	2	4	5	4	Vigor very good
Atriplex semibaccata	'CORTO'	1	3	3	3	
" "	P-15654	2	3	3	3	
" canescens	P-15644	3	4	4	4	
" "	A-15652	2	3	3	3	
" lentiformis	A-17156	3	3	4	4	

Pima Mine Dryland Plots seeded 3-29-71 on overburden material

Enchylacna tomentosa	P-15560	1	4	4	3	Small plants.
Atriplex semihaccata	'CORTO'	3	3	-	-	Plots washed out 72
" "	P-15654	4	2	3	-	Plots washed out 72
" canescens	P-15644	2	2	3	3	
" "	A-16652	2	1	2	2	
" lentiformis	A-17156	5	5	4	4	

Test work was conducted on pure tailing with the above species and no supplemental irrigation. However, no plants established satisfactory stands to evaluate.

Ratings 1 = excellent 5 = very poor

Cooperative Highway slope Field Evaluation Plantings, Wellton, Arizona, MLRA 30E, Elevation 250 ft. Mean annual ppt. 4.11 inches. Soils sandy (irrigation required to maintain stands).

Table 4

WELLTON HIGHWAY FEP

Oct 70 seeding (Irrig. to establish 1970) to	Stand Evaluations				
	1970	1971	1972	1973	1974
'CORTO'	2	4	4	5	
P-15654	2	4	5	5	-
Oct 72 Seeded Shrubs (Irrig. 30 day intervals, Apr-Sep)					
'CORTO'			2	2	?
P-15654			1	1	1

Ratings 1 = excellent 5 = very poor

Bowie, Arizona, MLRA 42D. Elevation 3700 ft. Mean annual ppt. 9.84 inches. Soils - compacted highway slope silty clay loam, moderately alkaline (pH 8.2).

Table 5

BOWIE HIGHWAY SLOPE

June 1972 Seeded slopes	Stand Evaluations			
	1972	1973	1974	
'CORTO'	3	3	3	Good vig
P-15654	3	3	3+	Good vig

Ratings 1 = excellent 5 = very poor

1972 Tucson City Medians

P-15654 and 'CORTO' direct seeded - established spring 1973; however, drought in 1973-74 caused all plants to die back. Some seedlings germinated in summer and fall of 1974.

Foot traffic across the area caused heavy damage and plant loss.

'CORTO' transplants were irrigated for establishment but died out after two years due to foot traffic. The compacted soil conditions in the area may have adverse effect on establishment of new seedlings.

Table 5

Australian Saltbush Seed Production (1970-1974)

<u>Date</u>	<u>Location</u>	<u>Acres</u>	<u>lbs. produced</u>	<u>Projected lbs/ac./y.</u>
11/70	F4 Border 5	.23	57.1	250.13
11/70	F4 Border 7	.27	177	654.90
9/72	F6 Border 2, 3, & 4	.55	117	212.94
9/73	F6 Border 3 & 4	.38	99	260.37
10/74	F6 Border 3 & 4	.38	29	76.27
TOTAL :		1.81	479.5	1,454.61
				x = 290.92

Table 6

Australian Saltbush Fodder Composition (2)

<u>Name</u>	<u>Location</u>	PERCENTAGE COMPOSITION					<u>Nitrogen Free Extract</u>	<u>Crude Fat</u>
		<u>Moisture</u>	<u>Pure Ash</u>	<u>Crude Protein</u>	<u>Crude Fiber</u>	<u>Green</u>		
A. semibaccata	Paso Robles, CA	75.00	4.93	3.73	3.73	10.41	.81	
A. semibaccata	Tulare, CA	78.00	4.93	3.73	3.73	10.41	.81	
Alfalfa (ave. for California)		75.04	1.80	4.91	6.34	11.09		
A. semibaccata	Paso Robles, CA	10.05	19.37	14.64	20.88	46.05	2.01	
Alfalfa (ave. for California)		10.95	6.43	17.60	22.63	39.31	3.0	