UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

and

AGRICULTURAL RESEARCH SERVICE

and the

UNIVERSITY OF ARIZONA AGRICULTURAL EXPERIMENT STATION

NOTICE OF NAMING AND RELEASE OF 'ROCKER' TANGLEHEAD *(HETEROPOGON CONTORTUS)*

The U.S. Department of Agriculture, Soil Conservation Service and U.S.D.A. Agricultural Research Service and the University of Arizona Agricultural Experiment Station announce the naming and release of 'Rocker' tanglehead (*Heteropogon contortus* (L.) Beauv. Ex. Roem. & J.A. Schultes) for commercial production and marketing of seed and plants.

Origin:

'Rocker' tanglehead was originally collected by Ron Bemis from a native stand on the Rocker M ranch, Cochise County, Arizona, in October, 1984. The collection site is located at T24S, R29E, SW1/4 of Section 8, approximately 275 meters north of Geronimo Trail. The elevation is 1,280 meters and the average annual precipitation is 343 millimeters. The mean annual temperature is about 17 °C. Maximum winter temperatures reach -11 °C and maximum summer temperatures reach 43 °C.

Identification Numbers Used:

'Rocker' tanglehead has been evaluated under the following reference numbers:

9043377/T43377: Tucson, Arizona USDA-SCS Plant Materials Center

'Rocker' tanglehead has been assigned the following identification numbers:

PI 562143: USDA Plant Introduction Number

NSSL 263053.01: National Seed Storage Laboratory Serial Number

Description:

'Rocker' tanglehead is a native, perennial bunchgrass; ***Culms*** tufted, **100-120** centimeters tall, usually branching well above the base; ***Sheaths*** compressed-keeled, glabrous with a few short hairs at the junction with the blade; ***Ligule*** short, truncate, fringed with short, stiff hairs; ***Blades*** mostly **5-8** millimeters wide, flat or folded, scabrous, **20-30,** occasionally **36** centimeters long, usually ciliate on the margins with a few long, pappilose-hispid hairs; ***Racemes*** **3-7** centimeters long, produced on slender lateral culm branches as well as terminating the main culm; ***Rachis*** joints readily disarticulating at maturity; ***Glumes of staminate spikelet*** about **7** millimeters long, bright green, several-nerved, hirsute; ***Fertile spikelet*** about **1** centimeter long from the base of the long, stiffly-hispid callus to the glume apex, the first glume dark brown, correaceous, hispid, enclosing the second glume; ***Awn of fertile lemma*** stout, twisted, twice geniculate, pubescent below with spreading hairs mostly 0.5 to **1** millimeter long, readily deciduous at maturity, usually falling entangled with the awns of other spikelets (Taxonomic description for 'Rocker' provided by Dr. John R. Reeder (ret.) at the University of Arizona Herbarium, Tucson). (Greek, ***heteros,*** different, and ***pogon***, beard, referring to the awnless male and awned female spikelets [Munz and Keck **19731.)**

Heteropogon contortus is an obligate apomict (Emery and Brown **1957).** Normal chromosome numbers for this species is $2n=60$ (Gould **1975).**

Heteropogon contortus is a C_4 plant and virtually all growth occurs after the onset of summer rains (in Arizona: late July to early August), unless warm spring temperatures coincide with adequate soil moisture (Novelly **1986).**

Development and Use:

'Rocker' tanglehead was comparatively evaluated with **26** accessions of ***Heteropogon contortus*** in the **1986** ***Heteropogon contortus*** Initial Evaluation Planting (IEP) (see Table **1.).** In **1990,** 'Rocker' was one of four tanglehead accessions selected for best overall performance.

In **1991** all four accessions were transplanted into a spaced plant, mass selection block for evaluation and final selection. 'Rocker' was the superior performer in this planting. It has shown vigorous growth, is a larger, more robust plant, and flowers at a later time. Throughout the whole evaluation process, 'Rocker'

tanglehead has consistently flowered 2-3 weeks later than all other accessions. Beginning in late September, it continues to flower and produce seed through early November.

Observations in the mass selection block have shown that 'Rocker' averages a size of 120 centimeters by 120 centimeters versus an average size of all other plants of 70 centimeters by 90 centimeters. 'Rocker' did not exhibit this size difference in the IEP planting because the plants were planted too close together to allow them to express their true growth characteristics.
'Rocker' tanglehead exhibits a greater tolerance to drought conditions than the other accessions within the IEP block. Following the summer of 1991, in which the Tucson Plant Materials Center received well below-average precipitation, 'Rocker' produced an abundance of green herbage despite very low summer precipitation, where all other accessions tended to remain mostly dormant throughout the rest of the summer.

The ability of 'Rocker' tanglehead to initiate earlier spring growth than the other accessions will allow this selection to have a greater ability/advantage to compete for water and nutrients. In addition, the ability of this accession to stay green and initiate growth under extended drought-like conditions makes 'Rocker' tanglehead a desirable conservation plant.

'Rocker' was primarily selected for use in controlling rill and gully erosion because it produces dense stands of seedlings in areas where extra moisture is available. It's low palatability permit it to mature and produce seed where more palatable species may be too closely grazed to do so (Ward and Martin 1972).

According to Ward and Martin (1972), the value of tanglehead as an erosion control plant has been demonstrated on the Santa Rita Experimental Range, south of Tucson, Arizona. Before treatment (chaining), gullies and rills on the study area were raw and actively eroding. After chaining, dense stands of tanglehead filled most of the gullies and rills and erosion was greatly reduced.

Novelly (1986) states that the seed of Heteropogon contortus exhibits a dual inhibitory system to germination (Tothill 1977). Naked caryopses less than 4 months old exhibit dormancy akin to epicotyl dormancy, readily overcome by gibberelic acid, and also partly reduced by repeated wetting and drying. Dormancy declines with age with maximum germination occurring at 12 months of age. Seed remains viable for

up to four years if adequately stored. Maximum germination was recorded at constant 30 °C (Tothill 1977), with little increase at 35 °C. Constant 25 °C reduced germination as did alternating temperatures if one temperature was below 30 °C.

At the Tucson Plant Materials Center, 'Rocker' tanglehead has been harvested by hand as well as the Flail-Vac seed harvester using a brush speed of 200 RPM. After drying, the harvested material is then processed through a hammermill using a size 1/8 screen at moderate speed (to reduce damage to the seed). Following this process, the material is then processed through an office clipper using a top screen size of 3/64 x 5/16 and a blank screen on the bottom. Air flow is then adjusted to prevent viable material from being blown through the machine and lost.

Area of Adaptation:

Emery and Brown (1958) have stated that ***Heteropogon contortus*** consists of a relatively uniform series of populations with an extensive native range throughout most of the tropical and subtropical grassland regions of the world. The distribution of ***Heteropogon contortus*** is reported from every major land mass between 35 °N latitude and 35 °S latitude and is endemic in the New World, and in the Old World from South Africa to Australia, and numerous islands of the Pacific Ocean.

According to Kearny and Peebles (1969), in Arizona, ***Heteropogon contortus*** is reported from Mohave, Yavapai, Pinal, Cochise, Santa Cruz, Pima and Yuma counties, also reported from the Grand Canyon, at 305-1676 meters in elevation. USDA-SCS Range Site Description handbooks report this species also in Graham, Greenlee, Maricopa and La Paz counties.

In New Mexico this species is found mainly in the southwestern region of the state: Hillsboro, Tortugas Mountain, the Organ Mountains, as well as dry hills in the Upper and Lower Sonoran Zones at elevations ranging from 1064 to 1520 meters (Wooton and Standley 1972, Martin and Hutchins 1980).

In Texas tanglehead is found in areas of the following regions: Trans-Pecos Mountains, Edwards Piateau, South Texas Plains and the grasslands of the Gulf Coast, usually in sandy soil (Gould 1975).

In California tanglehead is listed as being found in a small portion of San Diego county and in northern Imperial county (Munz and Keck 1973).

In Hawaii this species is found on open, rocky slopes, as on Punchbowl and along the shore road at Diamond Head (Neal 1929).

Heteropogon *contortus* is found growing on a variety of soil textures (see Table 2):

Moderately coarse textured loamy soils (coarse sandy loam, sandy loam, fine sandy loam).

Medium textured loamy soils (very fine sandy loam, loam, silt loam).

Moderately fine textured loam soils (clay loam, sandy clay loam, silty clay loam).

Fine textured clayey soils (sandy clay, silty clay, clay).

Coarse textured sandy soils (coarse sand, sand, fine sand, very fine sand, loamy sands, loamy coarse sand, loamy sand, loamy fine sand, loamy very fine sand).

Seed Source:

The Tucson Plant Materials Center will be responsible for maintaining a supply of foundation and breeder seed. Foundation seed will be available for establishing seed source nurseries for commercial production through the Arizona Crop Improvement Association. Standards for all classes of seed will be included in the Arizona Seed Certification Handbook.

The suggested release date of 'Rocker' tanglehead is September 30, 1992. Limited quantities of foundation seed will be available for commercial production in 1993.

Literature Cited

Emery, W.H.P. and W.V. Brown, 1958. Apomixis in the *Gramineae*. Tribe *Andropoqoneae: Heteropoqon contortus.* Madrono, 14:238-246.

Gould, F.W. 1975. The Grasses of Texas. Texas A&M University Press, College Station. p.618.

Kearny, T.H. and R.H. Peebles, 1969. Arizona Flora. University of California Press, Berkeley and Los Angeles, p. 144.

Martin, W.C. and C.R. Hutchins, 1980. A Flora of New Mexico. Strauss and Cramer GmbH. 6901 Leutershausen, Germany. p.52.

Munz, P.A. and D.D. Keck, 1973. A California Flora with the Supplement. University of California Press, Berkeley and Los Angeles. p.198.

Neal, M.C. 1929. In Honolulu Gardens. Bernice P. Bishop Museum, Special Publication 13, Honolulu, Hawaii. p.25.

Novelly, P.E. 1986. The growth and development of *Heteropogon contortus.* Thesis (Ph.D. Renewable Natural Resources). University of Arizona, Tucson. pp.1-247.

Tothill, J.C. 1977. Seed germination studies with *Heteropoqon contortus.* Aust. J. Ecol. 2:477-484.

Ward, D.E. and S.C. Martin, 1972. Tanglehead - A dual purpose grass. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Wooten, E.O. and P.C. Standley, 1972. Flora of New Mexico. Strauss and Cramer GmbH. 6901 Leutershausen, Germany. p.52.

Donald W. Gohmert

Arizona State Conservationist
USDA - Soil Conservation Service

9/28/92
Date

Acting for

Chief
USDA - Soil Conservation Service

10/2/92
Date

for

Administrator
Agricultural Research Service

OCT 27 1992
Date

Director, Arizona Agricultural
Experiment Station
University of Arizona

11-12-92
Date

TABLE 1.

1986 Summary of Evaluations for Heteropogon *contortus*

Ace. #	Vigor	Height (cm)	Width (cm)	Seedhead Ht. (cm)	% Survival
441069	4	111	39	---	100
9047426	3	86	37	90	100
9043380	2	109	35	110	100
9043381	1	107	43	100	100
9043376	1	135	50	---	100
9043374	5	128	41	---	100
9043377	2	142	46	---	100
9039980	5	68	26	56	100
9015140	2	120	45	---	95
9047445	1	138	50	---	100
271174	5	95	43	---	81
9043379	2	110	38	95	93
9043375	4	135	35	---	100
9040203	4	46	120	---	100
9003765	5	114	40	---	33
9047425	3	138	48	---	94
9047416	4	114	34	---	100
9047446	3	80	33	104	100
9047428	4	115	43	---	50
364892	8	84	20	---	100
9047444	4	140	52	---	100
9047429	2	120	44	---	100
9043374	3	116	31	---	100
9004256	5	90	24	---	50
9047414	8	84	10	---	50
9043373	0	00	00	00	00

Vigor Ratings= 1-9; 1=best, 5=average, 9=poorest.

Mean Values for Evaluation Criteria for the 1986 Performance Summary

Vigor	Height (cm)	Width (cm)	Seedhead Ht. (cm)	% Survival
4	109	41	93	86

TABLE 1 CONT'D.

1987 Summary of Evaluations for
Heteropogon contortus

Acc.#	Vigor 1	Vigor 2	Avg. vigor	Height (cm)	Width (cm)	Seedhead Ht. (cm)
441069	4	1	2.5	30	110	85
9047426	4	2	3	40	95	99
9043380	6	2	4	40	85	87
9043381	5	2	3.5	40	100	86
9043376	2	1	1.5	50	110	108
9043374	5	3	4	40	80	70
9043377	1	1	1	45	105	100
9039980	9	3	6	20	70	70
9015140	3	1	2	40	155	85
9047445	3		3	50	130	105
271174	8	8	8	55	20	40
9043379	1	1	1	50	90	100
9043375	5	1	3	50	120	90
9040203	6	3	4.5	25	110	45
9003765	4	1	2.5	30	115	83
9047425	2	2	2	55	60	93
9047416	2	1	1.5	55	120	105
9047446	3	1	2	45	100	93
9047428	2	1	1.5	50	110	97
364892	6	2	4	35	75	85
9047444	3	1	2	50	140	99
9047429	5	1	3	50	75	85
9043374	3	1	2	50	135	106
9004256	4	2	3	35	125	95
9047414		4	4	20	40	50
9043373		9	9	10	10	

Vigor Ratings= 1-9; 1=best, 5=average, 9=poorest

Mean Values for Evaluation Criteria in the
1987 Performance Summary

Vigor 1	Vigor 2	Avg. vigor	Height (cm)	Width (cm)	Seedhead Ht. (cm)
4	2	3	41	96	86

TABLE 1 CONT'D.

1988 Summary of Evaluations for *Heteropogon contortus*

Acc.#	Vigor 1	Vigor 2	Vigor 3	Vigor 4	Avg. Vig	Ht. (cm)	Wd. (cm)
441069	2	2	3	3	2.5	85	110
9047426	2	2	3	3	2.5	100	100
9043380	2	2	5	6	3.8	70	90
9043381	2	1	4	3	2.5	80	75
9043376	2	2	2	1	1.8	90	75
9043374	2	3	3	4	3.0	100	115
9043377	2	2	5	4	3.3	90	100
9039980	2	7	9	8	6.5	40	20
9015140	2	2	2	2	2.0	85	100
9047445	2	3	2	2	2.3	90	120
271174	3		8	8	6.3	80	75
9043379	2	1	3	4	2.5	90	100
9043375		3	4	6	4.3	90	100
9040203	2	7	9	9	6.8	35	40
9003765	2	1	3	2	2.0	115	80
9047425	2	3	3	3	2.8	90	80
9047416	2	2	3	2	2.3	80	90
9047446	2	4	3	4	3.3	90	80
9047428	2	1	3	1	1.8	85	90
364892	2	0	0	0	0.0		
9047444	2		2	1	1.7	120	70
9047429	2	3	3	5	3.3	90	60
9043374	2	1	4	4	2.3	100	110
9004256	2	1	3	2	2.0	105	140
9047414	2	6	4	5	4.3	70	90
9043373		3	3	4	3.3	80	70

Vigor Ratings= 1-9; 1=best, 5=average, 9=poorest, 0=dead

Mean Values for Evaluation Criteria in the 1988 Performance Summary

Vigor 1	Vigor 2	Vigor 3	Vigor 4	Avg. Vig	Ht. (cm)	Wd. (cm)
2	3	4	4	3	86	87

TABLE 1 CONT'D.

1989 Summary of Evaluations for
Heteropogon contortus

Accession #	Vigor	Height (cm)	Width (cm)
441069	6	30	60
9047426	2	50	75
9043380	3	40	65
9043381	4	35	45
9043376	3	30	50
9043374	6	50	65
9043377	4	45	50
9039980	9	10	10
9015140	5	30	55
9047445	6	30	50
271174	8	25	45
9043379	2	50	65
9043375	7	30	40
9040203	9	10	10
9003765	5	35	60
9047425	8	25	40
9047416	6	35	45
9047446	9	20	40
9047428	3	35	75
364892			
9047444	3	35	60
9047429	3	35	50
9043374	2	50	65
9004256	1	65	105
9047414	6	30	35
9043373			

Vigor Ratings= 1-9; 1=best, 9=poorest.

Mean Values for Evaluation Criteria in the 1989 Performance Summary

Vigor	Height (cm)	Width (cm)
5	35	53

TABLE 2.

Natural Range of Adaptation for
Heteropogon contortus
in Arizona

Major Land Resource Area (MLRA): D30-1

RANGE SITE DESCRIPTION	PRECIPITATION ZONE (MM)	ELEVATION (METERS)	RELATIVE % OF TOTAL PLANT COMMUNITY BY WEIGHT
Tuff Hills	51-178	23-488	1-5%
Loamy Bottom	178-254	488-1067	10-15%
Sandy Bottom	178-254	488-1006	1-5%
Volcanic Hills	178-254	458-1220	1-5%
Granitic Hills	178-254	488-975	1-5%
Schist Hills	51-178	23-488	1-5%

Major Land Resource Area (MLRA): D31

RANGE SITE DESCRIPTION	PRECIPITATION ZONE (MM)	ELEVATION (METERS)	RELATIVE % OF TOTAL PLANT COMMUNITY BY WEIGHT
Tuff Hills	51-178	23-488	1-5%
Schist Hills	51-178	23-488	1-5%

Major Land Resource Area (MLRA): D39-4

RANGE SITE DESCRIPTION	PRECIPITATION ZONE (MM)	ELEVATION (METERS)	RELATIVE % OF TOTAL PLANT COMMUNITY BY WEIGHT
Granitic Hills	305-407	1220-1829	10-15%
Volcanic Hills	305-407	1220-1829	5-10%
Granitic Hills	407-508	1829-2073	5-10%
Limestone Hills	407-508	1097-1981	10-15%

TABLE 2 CONT'D.

Natural Range of Adaptation for
Heteropogon contortus
in Arizona

Major Land Resource Area (MLRA): D40-1

RANGE SITE DESCRIPTION	PRECIPITATION ZONE (MM)	ELEVATION (METERS)	RELATIVE % OF TOTAL PLANT COMMUNITY BY WEIGHT
Deep Sandyloam	254-305	488-1219	1-5%
Granitic Hills	254-305	732-1372	5%
Gravelly Hills	254-305	549-914	1-5%
Limey Slopes	254-305	549-975	5-10%
Sandy Bottom	254-305	549-914	5%
Schist Hills	254-305	732-1372	5-15%
Shallow Upland	254-305	671-1067	1-5%
Tuff Hills	254-305	762-1219	15-20%
Volcanic Hills	254-305	732-1372	10-15%

Major Land Resource Area (MLRA): D40-2

RANGE SITE DESCRIPTION	PRECIPITATION ZONE (MM)	ELEVATION (METERS)	RELATIVE % OF TOTAL PLANT COMMUNITY BY WEIGHT
Granitic Hills	178-254	488-1219	1-5%
Limey Hills	178-254	305-915	3%
Schist Hills	178-254	488-1067	1%
Tuff Hills	178-254	488-915	1-5%
Volcanic Hills	178-254	488-1219	1-5%

TABLE 2 CONT'D.

Natural Range of Adaptation for *Heteropogon contortus* in Arizona

Major Land Resource Area (MLRA): D40-3

RANGE SITE DESCRIPTION	PRECIPITATION ZONE (MM)	ELEVATION (METERS)	RELATIVE % OF TOTAL PLANT COMMUNITY BY WEIGHT
Granitic Hills	203-254	610-1219	10-15%
Volcanic Hills	203-254	610-1219	5-10%
Basalt Hills	254-305	610-1463	15-20%
Granitic Hills	254-305	610-1524	15-20%
Volcanic Hills	254-305	915-1463	5-10%

Major Land Resource Area (MLRA): D41-1

RANGE SITE DESCRIPTION	PRECIPITATION ZONE (MM)	ELEVATION (METERS)	RELATIVE % OF TOTAL PLANT COMMUNITY BY WEIGHT
Granitic Hills	406-508	1371-2134	5-10%
Volcanic Hills	406-508	1371-1829	10%

Major Land Resource Area (MLRA): D41-2

RANGE SITE DESCRIPTION	PRECIPITATION ZONE (MM)	ELEVATION (METERS)	RELATIVE % OF TOTAL PLANT COMMUNITY BY WEIGHT
Granitic	178-305	915-1371	5%

TABLE 2 CONT'D.

Natural Range of Adaptation for
Heteropogon contortus
in Arizona

Major Land Resource Area (MLRA): D41-3

RANGE SITE DESCRIPTION	PRECIPITATION ZONE (MM)	ELEVATION (METERS)	RELATIVE % OF TOTAL PLANT COMMUNITY BY WEIGHT
Basalt Hills	305-406	1371-2134	5-10%
Clay Hills	305-406	915-1676	1-5%
Clay Loam Upland	305-406	975-1585	10%
Deep Sandyloam	305-406	975-1585	5%
Granitic Hills	305-406	1372-1676	1-5%
Loamy Upland	305-406	975-1585	10%
Sandyloam Upland	305-406	1189-1463	5%
Shallow Upland	305-406	975-1585	10-15%