

# TAM 90

## *Annual Ryegrass*

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- High forage yield potential
- Improved winter hardiness
- Crown rust resistance
- Adapted to East and Southeast Texas

TAM 90 is a new variety of Italian annual ryegrass developed by the Texas Agricultural Experiment Station. TAM 90 was developed for improved forage yield potential and winter hardiness. It is a robust diploid annual ryegrass with wide leaves that give it the appearance of some tetraploids. TAM 90 was selected from a polycross involving three parents, which were ‘Gulf’, ‘Marshall’, and a breeding line TX-R-78-2. An early generation was grown on the High Plains at Amarillo for improved winter hardiness. Plants from seed harvested at Amarillo were space planted at Overton and were selected for seedling vigor, wide leaf width, high forage yield potential, and winter hardiness. Plants from seed harvested at Amarillo were space planted at Overton and were selected for seedling vigor, wide leaf width, high forage yield potential, and winter hardiness. Thirty-five superior plants were selected and grown in isolation and allowed to cross-pollinate and produce a seed crop. Seed from this bulk was labeled TX-R-85-2 and was the original population that has demonstrated superior characteristics for forage and seed yield, winter hardiness, and crown and stem rust resistance.

### **Performance Data**

TAM 90 has been an outstanding forage producing line in clipping tests for the past 3 years at the Texas A&M University Agricultural Research and Extension Center at Overton and the Research Station at Angleton. Data comparing TAM 90 with Gulf, Marshall (most widely grown diploid varieties), Tetragold (a popular tetraploid blend), Jackson, and Surrey (two newly released diploid varieties) are presented. Data at Overton (Table 1) and Angleton (Table 2), have indicated that TAM 90 is superior to Gulf for forage yield. Comparison at Overton between TAM 90 and Marshall, Jackson, Surrey, and Tetragold indicated that TAM 90 produced comparable yields, and over the 3-year period, has produced the highest mean annual yield of 8756 lb of forage per acre. Compared with other commercially grown varieties, TAM 90 has produced higher forage yields at Angleton (Table 2).

Table 1. Total season forage yield over 3 years at Overton, Texas.

Variety	Year			3-Year Mean
	1987-88	1988-89	1989-90	
-----Dry Matter lb/ac-----				
TAM 90	14018	5598	6651	8756
Gulf	10812	5653	5833	7433
Marshall	13899	6728	5623	8750
Jackson	12996	6052	6425	8491
Surrey	12965	6024	6683	8557
Tetragold	13591	6019	5226	8278
LSD (10% level)	1799	975	1000	

Table 2. Total season forage yield over 3 years at Angleton, Texas.

Variety	Year			3-Year Mean
	1987-88	1988-89	1989-90	
-----Dry Matter lb/ac-----				
TAM 90	8224	5596	4529	6116
Gulf	6690	5582	4390	5554
Marshall	7947	4422	4128	5499
Jackson	7305	5322	4678	5768
Surrey	7444	5467	4719	5877
Tetragold	7020	--	4673	5846*
LSD (5% level)	751	504	679	

\*Tetragold was not tested at Angleton in 1988-89 and therefore this mean is for 2 years.

Forage data from Beeville, Texas, in 1988-89 and 1989-90 (Table 3) indicated TAM 90 produced equal yields compared with the best commercial lines. Forage clipping results from three locations in Georgia in 1989-90 indicated that TAM 90 was highly productive at each location.

Table 3. Ryegrass dry matter yield for 1988-89 and 1989-90 at TAES-Beeville.

Variety/Line	1988-89 Harvest Date and Yields			
	February 10	March 30	May 26	Total
	-----Dry Matter lb/ac-----			
TAM 90	1250	1861	478	3588
Surrey	1212	2002	621	3835
Tetragold	1397	1925	495	3817
Gulf	1400	1917	412	3729
Marshall	1290	1745	588	3623
LSD (0.05)	278	448	234	600
	1989-90 Harvest Date and Yields			
	February 13	March 16	May 3	Total
	-----Dry Matter lb/ac-----			
Beefbuilder	1381	1388	1220	3990
Gulf	1413	1568	1210	4192
Marshall	516	1093	1269	2878
Tetragold	968	1638	1746	4353
TAM 90	1465	1440	1725	4630
LSD (0.05)	486	828	602	1462

Seed rates were 35 lb/ac in 1988-89 and 40 lb/ac in 1989-90.

### Animal Performance

TAM 90 was compared with Gulf in 1989-90 in a replicated pasture grazing study at Overton. Seed was drilled into a Tifton 78 bermudagrass sod on October 18, at a seeding rate of 46 lb/ac. The Tifton 78 had been sprigged the previous summer (1989) and had not reached a full stand. Actual N (applied as ammonium nitrate) was applied at a rate of 68 lb/ac on each of four dates (November 14, January 23, March 6, and April 2). Brahman steers weighing about 450 lb were utilized as test animals. These animals were placed on the pastures when sufficient forage was available to maintain them. Additional animals were added to the paddocks when surplus forage was available. This resulted in grass being grazed to a height of from 2- to 5-inches.

TAM 90 produced sufficient forage for grazing on February 2, while Gulf was not ready for grazing until February 12. The grazing study was terminated on June 4 when both varieties were no longer producing forage. TAM 90 produced 10 more total days of grazing time than did Gulf (122 versus 112 days). Results (Table 4) indicate that the average daily gain (ADG) for both varieties were similar (1.50 lb for TAM 90 versus 1.56 lb for Gulf). The calf gain for each variety was similar (183 versus 175 lb/calf for TAM 90 versus Gulf). The major difference in varieties was in stocking rate and winter hardiness. The Gulf pastures had to be partially re-seeded due to winter kill in mid-December. TAM 90 was able to maintain 4.36 five hundred lb calves/ac compared to 3.74 calves/ac for Gulf during the test. This difference resulted in significantly greater gain/ac for TAM 90 (796 lb/ac compared with only 655 lb/ac for Gulf). This was an increase of 141 lb of beef/ac to produce more forage/ac allowed it to maintain a higher stocking rate throughout the study. These results indicate the higher forage yields demonstrated by TAM 90 in clipping test were also apparent in a pasture environment.

Table 4. Animal performance on TAM 90 versus Gulf ryegrass at Overton, Texas in 1989-90.

Variety	ADG lb	Days on Test	Gain per Calf	Stocking Rate (500 lb calf)	Gain per Acre
TAM 90	1.50	122	183	4.36*	796**
Gulf	1.56	112	175	3.74	655

\*Stocking rates were calculated to be equivalent to 500 lb Brahman calves.

\*\*Gains were actual pounds gain per ac for ryegrass grazing season.

Animal gains were determined on two replications or four 3-acre paddocks.

### Winter hardiness

TAM 90 was improved for winter hardiness by natural selection on the High Plains at Amarillo, Texas. Spaced plants at Overton were also selected for freeze resistance. Significant improvement for winter hardiness was observed for the first time in 1990 at both Overton and Angleton. Freeze damage ratings (Table 5) indicated that TAM 90 was more winter hardy than Gulf or Tetragold, and that it was very similar to Marshall, Jackson, and Surrey. The temperatures causing the differential freeze injury were -3°F at Overton and 7°F at Angleton during late December. Cold weather prior to these extremely low temperatures had winter-hardened the ryegrass or more winterkill would have been expected.

### Crown rust

Crown rust on annual ryegrass is an important fungal disease along the Gulf Coast in Texas and the Southeastern United States. This disease is usually not a problem in Texas 100 miles or more from the Gulf of Mexico. Varieties within the 100 mile range need to be resistant to crown rust. Crown rust ratings (Table 6) recorded at Angleton indicated that TAM 90 has good and stable resistance. Gulf was originally released because of its crown rust resistance and this resistance has remained stable for the past 30 years. Marshall ryegrass is very susceptible to crown rust and yields are often reduced near the Gulf Coast. Resistance of TAM 90 to crown rust appears to be slightly less than Gulf, but much better than Marshall. TAM 90 also has demonstrated effective stem rust resistance when grown in Oregon (Table 7). Stem rust has not been a problem in Texas.

Table 5. Freeze damage ratings in 1989-90 at Overton and Angleton, Texas.

Variety	Angleton	Overton
TAM 90	1.5 <sup>a</sup>	4 <sup>b</sup>
Gulf	3.2	10
Marshall	1.2	2
Jackson	1.0	3
Surrey	1.0	3
Tetragold	3.5	6
LSD (10% level)	0.54	4.1

<sup>a</sup>Data at Angleton were recorded (January 15, 1990) on a 0-5 scale where 0 = no damage and 5 would have = 100% killed.

<sup>b</sup>Data at Overton were recorded (February 17, 1990) as percent leaf area killed by freeze damage.

Table 6. Crown rust ratings at Angleton, Texas.

Variety	1987-88	1988-89	1989-90
	0 to 9 rating*		
TAM 90	0.7	2.2	1.0
Gulf	0.2	1.7	1.0
Marshall	2.7	8.0	6.2
Jackson	0.2	1.0	0.7
Surrey	1.7	1.7	1.2
Tetragold	1.7	-- <sup>b</sup>	1.2
LSD (5% level)	-- <sup>a</sup>	0.8	0.9

\*Crown rust ratings were on a 0 to 9 scale where 0 = no rust and 9 = 90% of leaves covered by rust pustules.

<sup>a</sup>Data recorded from one replication.

<sup>b</sup>Tetragold was not tested in 1988-89.

Table 7. Stem rust ratings at three dates over 2 years at Brownsville, Oregon.

Variety	Stem rust ratings on a 0 to 9 scale*					
	1989	1990	1989	1990	1989	1990
	1 June		10 June		25 June	
TAM 90	0	1	1	1	3	4
Gulf	1	2	1	3	6	7
Surrey	1	1	1	2	4	4
Fla 80	1	1	1	1	3	4
Marshall	3	3	5	5	7	8
Magnolia	3	3	3	5	6	7

\*Test consisted of 4 replications of 25 spaced plants per replication or 100 total plants per variety. Visual rust ratings made on three dates during normal period of pollination and infectivity.

Data collected by Dr. Kevin McVeigh, Brownsville, Oregon.

### **Sources of Seed**

Seed of TAM 90 ryegrass can be purchased from East Texas Seed, Inc., P.O. Box 569, Tyler, Texas 75710 (800-888-1371).