

Bulletin 728

October 1950

MUSTANG OATS

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Comparative winter survival of Mustang (left) and New Nortex (right) varieties.

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Digest

This bulletin reports the development and characteristics of Mustang, a new winter-hardy oat variety which is now available to Texas farmers.

This new variety was developed cooperatively by the Texas Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture.

While the major portion of the development and testing was done at the Denton station, workers at eight other locations throughout the oat-growing sections of Texas cooperated in the work. Results obtained with this variety in the Southern regional oat experiments also are reported.

Winterkilling is an important hazard of production of fall-sown oats in Texas, often causing the loss of several thousand acres. The planting of Mustang, which is approximately 25 percent more winter-hardy than the present commercial varieties of oats, should aid in reducing this loss.

Because of its resistance to crown (leaf) rust and its winter-hardiness, Mustang will fit well into the agriculture of the State, being suitable for grain production in Central and North Texas; and for winter pasture in South Texas.

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Mustang Oats

I. M. ATKINS*

OATS ARE SOWN for grain each year on about 1,200,000 acres in Texas. An additional large acreage is sown for winter pasture in the southern part of the State. Most of the acreage sown for grain is in the Central Texas Blacklands and Rolling Plains. Variable weather conditions of these areas necessitate the growing of oat varieties that are able to withstand wide extremes in temperature and rainfall. Although the winters are usually relatively mild, rapid fluctuations in temperature often occur. Oats growing throughout the winter months are often killed by these cold snaps at temperatures they would survive if they were cold hardened.

The ideal oat variety for the State would be one that could be grown in North Texas for grain production and in South Texas for winter pasture. Red Rustproof has been the standard type of oat grown in Texas since its introduction about 1875. Probably few other types of oats have been so widely grown for so long a time. However, the Red Rustproof strains are subject to winterkilling and are often seriously damaged by crown (leaf) and stem rust, especially when grown in South Texas for winter pasture.

As a result of breeding work over a period of years, a new variety named Mustang, is now available. This new variety is more winter-hardy and more disease-resistant than most varieties now grown in Texas.

Development

Mustang was developed from a cross between Fulwin, one of the most winter-hardy varieties known, and a selection from a cross of Lee and Victoria. This Lee x Victoria selection was not named nor distributed. Fulwin is very susceptible to crown (leaf) and stem rust and, therefore, poorly adapted to Texas conditions.

The cross from which Mustang was selected was made by F. A. Coffman, senior agronomist in oat investigations, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture. Early generations of the cross were

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grown at the USDA Agricultural Research Administration center at Beltsville, Md.

A number of F_5 (fifth generation) lines were sent to Denton, Texas, in the fall of 1942 for trial. The selection, which later was named Mustang, was one of only a few that survived the winter of 1943, one of the most severe and unusual seasons on record at Denton. So promising was the new strain that reselections were made immediately and the bulk lot of seed increased and placed in all Texas variety tests the following season.

Yields

Mustang oats have been grown at Denton in replicated yield trials 6 years from fall-seeding and 7 years from spring-seeding. The variety has been included in replicated trials from 1 to 6 years at other substations in the State and has been included in the Southern cooperative fall-sown oat experiment since 1946. Yields are shown in Table 1.

Table 1. Average yields of Mustang and five commercial varieties of oats at several Texas substations, 1944-50

Item	No. years tested	Variety Yield of grain, bushels per acre					
		Mustang	Fulwin	New Nortex	Frazier	Fultex	Stanton
Fall sown at:							
Denton.....	7	59.7	41.0	54.0	34.3	47.7	49.6
Greenville.....	5	57.4	41.4	57.7	22.0	42.2	54.1
Iowa Park.....	5	79.0	65.1	78.8	63.2	75.1	78.5
Chillicothe.....	7	61.6	57.0	63.7	49.2	70.7	73.2
Stephenville.....	3	64.8	37.6	59.7	42.2	39.7	55.9
Temple.....	4	57.5	.....	47.2	39.0	53.0	42.7
Comfort.....	2	50.9	0.2	39.0	29.4	42.1	38.3
College Station..	5	56.2	.....	44.1	.....	53.5	57.0
Average.....	.....	60.9	.....	55.5	.....	53.0	56.2
Regional test..	3	62.3	.....	63.2 ¹	.....	55.7	65.7
Spring-sown:							
Denton.....	7	51.6	30.8	46.2	45.6	48.9	43.0

¹Appler Rustproof substituted.

At the Denton station, Mustang has outyielded its winter-hardy parent, Fulwin, by a wide margin. This is largely due to Mustang's resistance to crown (leaf) rust. It has outyielded New Nortex, the most extensively-grown commercial variety in Texas, from both fall and spring seedings

At other Central Texas locations, Mustang has outyielded New Nortex and most other commercial varieties. The greater resistance of Mustang to low temperature and to crown rust

has been an important factor in this superior yield at these locations. The yields at Greenville do not reflect the full advantage of the winter-hardiness of Mustang because, in 1947, it survived to produce a good yield when all other varieties were killed. However, birds destroyed the crop, so no data were obtained on yields.

At the Iowa Park and Chillicothe stations in the Rolling Plains area, Mustang has produced average yields slightly below Fultex, New Nortex and Stanton. Winterkilling has not been a factor at these locations during the testing period as plants remained in a hardened condition. Seasonal conditions also were favorable for very high yields and, in the Southwest under such conditions, no varieties have yet been found equal to the Red Rustproof strains.

Winter-hardiness

Mustang is outstanding in cold resistance under Texas conditions. It survived a most unusual series of temperatures in 1943, the year it was selected. Previous fall growth was well-developed and the crop well-hardened. Starting with a temperature of 76° F. on January 16, the temperature dropped rapidly to 4° F. on January 19. Below freezing temperatures continued for 2 days and were followed by record maximum temperatures for January of 87°, 89° and 87° on the 22nd, 23rd and 24th, respectively. These high temperatures were followed by a second "norther" and a temperature of 16° F. on January 27. A third severe freeze, with a low of 5° F. occurred on March 3.



Figure 1. Only 30 percent of the New Nortex plants (left) survived the winter of 1946-47 at Denton. Mustang (right) showed an average survival of 82 percent.

These combined freezes killed all except the most cold-resistant varieties. The parent strain of Mustang survived to approximately 50 percent stand and recovered to yield 46.8 bushels per acre.

Over a 7-year period, 1944-50, in which winterkilling occurred in 5 of the 7 years at Denton, Mustang survived 85.8 percent, as compared with 83.0 percent for its Fulwin parent, 57.2 percent for New Nortex, 53.6 percent for Frazier, 51.2 percent for Fultex and 70.4 percent for Stanton. Similar observations of winter-hardiness were recorded at Greenville, Stephenville and Temple, where Mustang has demonstrated repeatedly that it will often survive when other varieties are killed by low temperatures.

Figure 1 shows a plot of Mustang and of New Nortex oats at Denton in 1947, when the average survival of Mustang was 82 percent and that of New Nortex was 30 percent.

Disease Resistance

Crown (leaf) and stem rusts have been major limiting factors in oat production in Texas for many years and are potentially dangerous every year. The average observed percentages of crown and stem rusts on several varieties of oats at Denton for 7 seasons are given in Table 2.

Table 2. Average percentage of rust infection of oats from fall and spring seeding at Denton, 1944-50

Variety	Crown rust		Stem rust	
	Fall-sown	Spring-sown	Fall-sown	Spring-sown
		Percent	rust	
Mustang.....	1	6	7	26
Fulwin.....	58	55	4	21
New Nortex.....	8	32	9	31
Fultex.....	T	3	8	34
Frazier.....	36	67	8	16
Stanton.....	3	10	8	38

Mustang is not resistant to stem rust but it appears to be no more susceptible than the varieties commonly grown in Texas. The crown rust resistance of Mustang is outstanding as compared with Fulwin. This resistance is largely responsible for Mustang's greater yielding ability. Mustang is shown in Figure 2 growing beside Fulwin at Denton in 1945 when Mustang produced an average yield of 50.2 bushels per acre and the severely-rusted Fulwin yielded only 2.6 bushels per acre.

The crown (leaf) rust resistance of Mustang should be of particular value when it is used for winter pasture in South



Figure 2. Crown (leaf) rust damaged Fulwin oats, at the left, so severely at Denton in 1945 that the yield was only 2.6 bushels per acre. Mustang, at the right, which is resistant to crown rust, yielded 50.2 bushels per acre in the same test.

Texas, as it will aid in checking the development of early rust epidemics and the lost of forage by rust.

Helminthosporium blight is a relatively new disease which, in the more humid sections of Texas, has caused serious losses in oats derived from Victoria hybrids. The disease is both seed and soil-borne and becomes especially serious when susceptible varieties are grown repeatedly on the same land. The disease causes reduced stands, rotting of the roots of surviving plants, reddish brown tinge to the leaves, lodging of plants and reduced yields.

When sown in infested soil in special disease tests, Mustang has shown more tolerance to the Helminthosporium blight than most varieties related to Victoria, the crown-rust resistant parent. However, to guard against losses from this disease, growers should rotate Mustang oats with other crops, and treat the planting seed with a mercurial dust such as Ceresan M or New Improved Ceresan. Seed treatment is also recommended to control smut.

Growth Characteristics

Mustang appears to possess growth characteristics which make it of special value for forage production in Texas. In

North Texas, its early growth habit is prostrate, similar to that of winter wheat. This slow, early development probably is associated with its resistance to low temperatures. Starting in mid-winter, it grows more rapidly than many varieties and produces abundant forage in late winter and early spring. It has been especially valuable for pasture during this period in the Rolling Plains.

Observations and limited clipping tests in South Texas indicate that Mustang grows more vigorously and produces more forage throughout the winter than do the Red Rustproof strains.

These characteristics make Mustang well suited to Texas conditions as seed produced in the main small-grain section of the State may be used in South Texas for seeding for winter pasture.

The grain of Mustang is gray, rather slender and of medium length. It is usually awnless, but weak awns may be found on some grains. The 6-year average test weight of Mustang, Fultex and New Nortex was 31.2, 32.8 and 29.8 pounds per bushel, respectively.

Acknowledgments

Oat and other small-grain experiments in Texas are conducted by the Texas Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture.

Acknowledgment is due the following individuals for permission to use data obtained at their locations: E. S. McFadden and George W. Rivers of the Department of Agronomy, Texas Agricultural Experiment Station, College Station; J. R. Johnston, E. N. Stiver, J. R. Quinby, L. E. Brooks and W. E. McCullough of the Temple, Chillicothe, Iowa Park and Stephenville stations; D. R. Hooton, U. S. Cotton Field Station, Greenville; K. D. Portor, Amarillo Conservation Experiment Station, Amarillo; R. G. Holekamp, Comfort Seed Growers Association, Comfort; and F. A. Coffman, U. S. Department of Agriculture, for yields recorded in the cooperative fall-sown oat experiment.