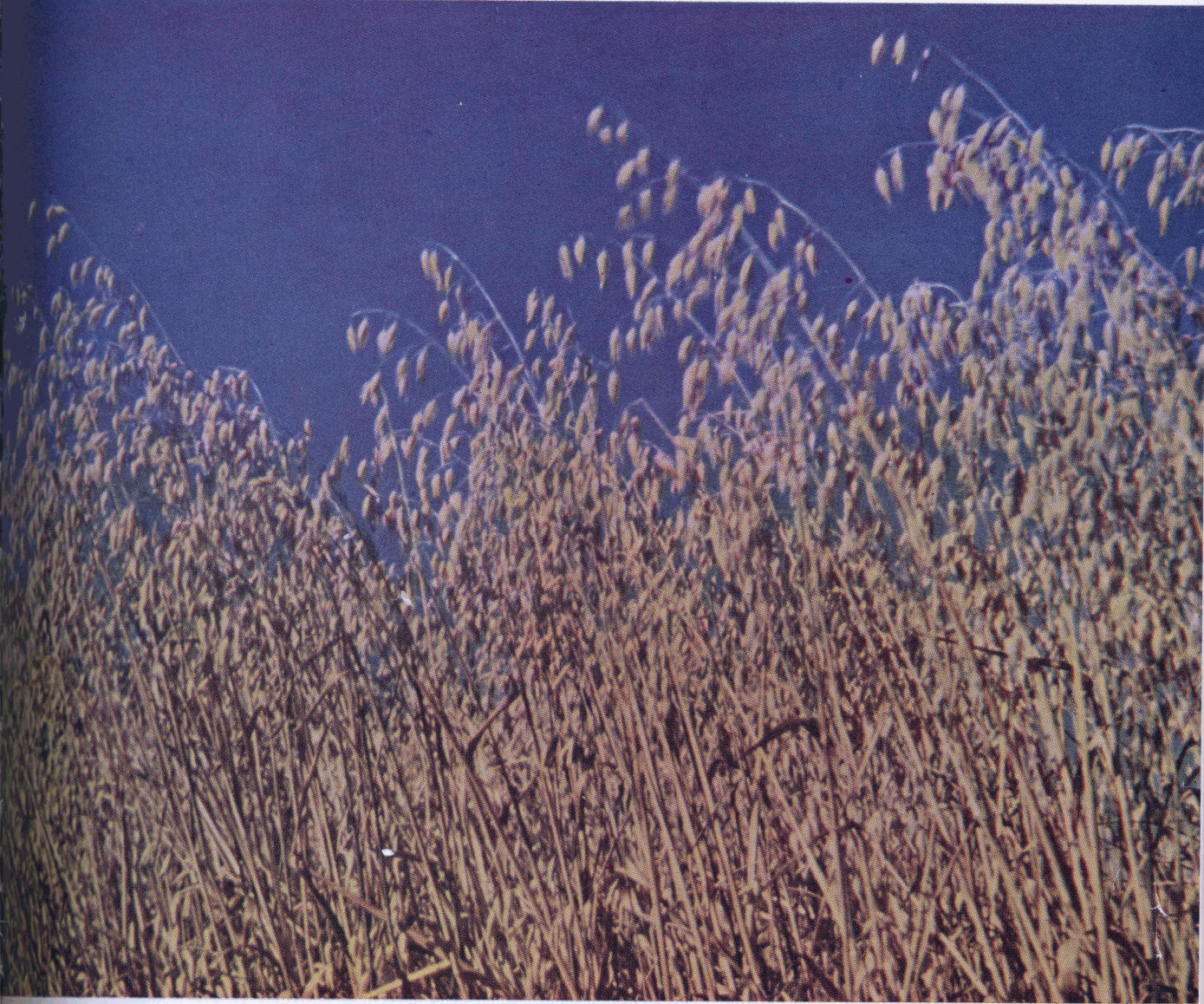


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Alamo Oats

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TEXAS AGRICULTURAL EXPERIMENT STATION

R. D. LEWIS, DIRECTOR, COLLEGE STATION, TEXAS

IN COOPERATION WITH THE U. S. DEPARTMENT OF AGRICULTURE

DIGEST

This bulletin reports the development and characteristics of Alamo, a new dual-purpose oat variety now available to Texas farmers.

This variety was developed cooperatively by the Texas Agricultural Experiment Station and the Section of Cereal Crops and Diseases, Field Crops Research Branch, Agricultural Research Service, U. S. Department of Agriculture.

Because of its high resistance to prevailing races of crown (leaf) and stem rust in Texas, Alamo can be grown in sections of South Texas where heretofore these diseases have prevented the growing of oats for grain.

The variety is especially well adapted to spring seeding throughout the northern part of the State. Its early maturity and strong straw make it suitable for use as a companion crop with sweetclover and for direct combining. Alamo has a plump, red seed which is practically free of awns and has a high test weight.

Alamo is susceptible to *Helminthosporium* blight; therefore, it should be grown in rotation with non-susceptible crops, and its seed should be treated with Ceresan M or other seed disinfectant. It is less cold resistant than Mustang or Red Rustproof strains, and should not be fall-sown north of approximately the Austin area of Central Texas.

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Alamo Oats

I. M. ATKINS and G. W. RIVERS*

OATS IS ONE OF THE MAJOR GRAIN AND FORAGE CROPS of Texas. It is grown on an average of 1,200,000 acres for grain and on an additional large acreage for forage in the form of winter pasture. Most of the acreage is in the central part of the State (considered from east to west) but in seasons of favorable spring rainfall, large acreages are grown in the western part.

In the main commercial grain producing area of Central Texas, oats may be grown from either fall or spring seeding. Most of the acreage is sown in the fall because winter-type varieties such as the Red Rustproof strains usually produce higher yields when sown in the fall. When extensive acreages are winter-killed, a large acreage is spring-sown in Central Texas. Normally, most of the acreage in the northwestern part of the State is spring-sown.

New Nortex and other Red Rustproof type strains, and the new winter-hardy variety, Mustang, occupy most of the acreage sown to oats in

Texas. The Red Rustproof strains are late maturing and are susceptible to both crown (leaf) and stem rust.

Mustang is early maturing but is very susceptible to stem rust. Because these factors are important in determining yields when oats are spring-sown, a variety adapted to spring seeding is needed throughout North Texas.

A new variety, which has been named Alamo, is available for spring seeding throughout the northern part of the State and is also adapted to fall seeding in South Texas. This variety is resistant to the races of crown and stem rust now prevalent in Texas. It, however, is susceptible to other races of these diseases. Should they become prevalent in Texas, they may cause damage to this variety. Alamo is susceptible to Helminthosporium blight, which may cause damage to this variety under some conditions.

DEVELOPMENT

Alamo was developed from a cross between Victoria-Hajira-Banner, C.I. 4019, an unnamed Canadian strain of oats which is resistant to many races of crown and stem rust, and Fulghum-Victoria, C.I. 3528, a sister strain of the variety Fultex. The cross was made by Dr. H. C. Murphy,

*Respectively, agronomist in charge of small grain research, Texas Agricultural Experiment Station, and the Section of Cereal Crops and Diseases, Field Crops Research Branch, Agricultural Research Service, U. S. Department of Agriculture; and instructor, Texas Agricultural Experiment Station.

TABLE 1. AVERAGE YIELDS OF ALAMO AND FIVE COMMERCIAL VARIETIES OF FALL-SOWN OATS AT LOCATIONS IN TEXAS, 1947-52, AND IN THE USDA REGIONAL FALL-SOWN OAT EXPERIMENT, 1950-53

Locations	Number years tested	Yield of grain, bushels per acre						
		Variety						
		Alamo	Fultex	Frazier	Mustang	New Nortex	Ranger	L.S.D. ¹
Southern stations:								
Winter Haven	1	51.6	36.3	31.2	42.2	22.8	25.6	10.6
Beeville	1	31.3	30.1	22.8	33.2	23.1	27.3	4.9
Prairie View	1	41.5	37.2	28.3	42.0	34.1	36.8	7.5
College Station	4	65.2	42.6	33.6 ²	59.4	47.0	53.3	9.3
Brazos River Lab.	1	26.1	21.0	25.2	21.1	28.3	26.6	3.1
Lockhart	1	22.3	23.7	14.6	25.7	20.6	22.5	6.2
Comfort	3	56.8	49.0	41.2	55.3	45.5	55.8	5.8
Weighted average		50.3	38.8	31.7	47.3	37.8	43.3	
Central stations:								
Temple	5	50.9	49.1	49.1 ²	56.4	57.7		6.4
McGregor	1	78.3	77.1	69.6	75.4	87.5		13.6
Stephenville	3	53.3	50.5	40.7	54.4	51.5		7.1
Abilene	1	14.8	10.1	11.9	10.5	15.4		7.1
Weighted average		50.8	48.4	44.9	53.1	54.6		
Northern stations:								
Greenville	2	82.8	65.0	61.9	99.9	83.5		10.6
Denton	4	51.0	54.8	51.2	73.2	69.9		6.3
Iowa Park	2	66.3	75.0	54.2	74.7	83.3		11.2
Chillicothe	2	35.0	40.2	30.3	33.3	39.2		8.5
Spur	1	7.7	6.9	7.7	5.5	8.8		5.1
Amarillo	1	30.6	36.4	40.3	30.9	31.6		8.8
Weighted average		50.9	51.9	45.5	62.1	69.3		
USDA regional nursery:								
Southern stations	3	53.5	51.0		52.4	46.3 ³		
Northern stations	3	48.8	54.1		68.2	57.7		

¹Least significant difference at the 5 percent level.

²Comparable yield.

³Appler Rustproof substituted for New Nortex.

TABLE 2. AVERAGE YIELDS OF ALAMO AND FOUR COMMERCIAL VARIETIES OF OATS WHEN SPRING-SOWN AT EIGHT LOCATIONS, 1947-53

Locations	Number years tested	Yield of grain, bushels per acre					
		Variety					
		Alamo	Fultex	Frazier	Mustang	New Nortex	L.S.D. ¹
Amarillo	2	35.9	31.4	35.2 ²	35.0 ²	29.8	7.7
Chillicothe	2	29.5	29.0	26.5	26.6	11.5	—
Iowa Park	2	60.3	59.4	54.3	57.2	38.4	5.9
Denton	7	65.3	57.5	53.6	62.4	53.0	4.1
Greenville	2	78.7	67.8	61.7	57.0	45.4	11.7
Comfort	3	34.0	25.1	39.2 ²	27.9	25.3	6.4
McGregor	1	63.6	60.3	44.8	62.3	45.1	5.4
Temple	1	49.3	40.7	40.2	41.9	34.0	9.4
Weighted average		54.0	46.9	46.1	48.2	38.4	

¹ Least significant difference at the 5 percent level.

² Comparable yield.

senior agronomist in charge of oat improvement work for the U. S. Department of Agriculture. Seed from the first generation plants were sent to Denton and the segregating generations of the cross were grown at that location. The selection, which was named Alamo (selection 73-44-90, C.I. 5371), was made by the senior author in 1944.

YIELDS

Commercial varieties and new strains of small grain being considered for release to farmers are tested thoroughly throughout Texas to determine their range of adaptation. Alamo has been tested in the fall-sown oat variety tests at most of the cooperating stations and from spring seeding at a selected group of stations in the area where oats

normally may be spring-sown. Alamo also was tested in the other Southern States in the regional fall-sown oat experiment of the U. S. Department of Agriculture.

The performance of Alamo in comparison with five commercial varieties from fall seeding at locations in Texas and in the regional nursery is shown in Table 1. The stations are grouped into southern, central and northern locations. Data from spring seeding at eight stations are given in Table 2. A weighted average for each group of stations is given. Least significant differences are given for each location. This figure represents the smallest difference by which varieties may differ in yield at odds of 19 to 1 that this difference is real and not due to chance.

TABLE 3. AGRONOMIC DATA FOR ALAMO AND FIVE COMMERCIAL VARIETIES OF OATS AT SEVERAL TEXAS STATIONS AND THE USDA REGIONAL NURSERIES, 1947-53

Item	Number station years	Variety					
		Alamo	Fultex	Frazier	Mustang	New Nortex	Ranger
Test weight, pounds per bushel							
Spring-sown, Texas stations	19	31.5	29.1	31.3	28.8	25.8	
Fall-sown, Texas stations	30	32.0	30.6	31.5	30.0	28.1	28.7
Fall-sown, regional tests	20	32.8	32.1		31.2	27.9 ¹	
Date headed							
Spring-sown, Texas stations	18	5-5	5-7	4-30	5-7	5-12	
Fall-sown, Texas stations	22	4-7	4-7	4-3	4-9	4-13	4-11
Fall-sown, regional tests	42	4-17	4-20		4-22	4-25 ¹	
Date ripe							
Spring-sown, Texas stations	15	6-3	6-2	5-30	6-7	6-10	
Fall-sown, Texas stations	20	5-15	5-12	5-10	5-18	5-20	5-17
Fall-sown, regional tests	17	5-25	5-24		5-28	5-25 ¹	
Survival in fall-sown tests, percent							
Texas stations	11	28.5	58.0	54.7	86.6	69.2	64.0
Regional tests	35	55.0	72.2		81.6	64.7 ¹	
Crown (leaf) rust, percent							
Spring-sown, Texas stations	8	Tr	1.2	55.0	3.8	25.0	
Fall-sown, Texas stations	13	0.8	4.2	54.5	2.2	26.2	6.3
Stem rust, percent							
Spring-sown, Texas stations	9	0	30.3	15.8	16.6	25.7	
Fall-sown, Texas stations	14	0	26.9	20.3	15.9	19.8	21.1
Plant height, inches							
Spring-sown, Texas stations	7	28.3	26.9	28.4	28.7	27.4	
Fall-sown, Texas stations	16	31.2	30.2	32.8	31.6	30.8	31.5
Fall-sown, regional tests	28	37.1	35.7		39.8	40.1 ¹	
Lodging, percent							
Texas stations	5	11.0	25.6	59.0	25.0	56.4	
Regional tests	28	26.9	20.0		43.2	26.6 ¹	
Estimates of forage value ²							
Regional tests, fall estimate	106	106	104		96	100 ¹	
Regional tests, spring estimate	48	118	107		96	100 ¹	

¹ Data for Appler, a strain of Red Rustproof, substituted for New Nortex as the latter was not included in regional tests.

² Visual estimates of forage growth in percent of Red Rustproof as a standard.

Results obtained in fall-sown tests at South Texas stations and at southern stations in the regional tests show that Alamo equalled or exceeded the yield of the commercial varieties with which it was compared. This superiority is greatest at Winter Haven and College Station. Over a 4-year period at College Station, Alamo averaged 65.2 bushels per acre, as compared with 42.6 bushels for Fultex, 47.0 bushels for New Nortex and 53.3 bushels for Ranger. While the yield of Mustang was nearly as high as Alamo, Mustang and other varieties may be damaged seriously some seasons by stem rust. During the testing period, this occurred only in 1950 when Alamo yielded 82.6 bushels and New Nortex only 34.8 bushels per acre.

In the central area, Alamo yielded slightly less than New Nortex and Mustang at Temple but approximately the same at the other stations.

At the northern stations, Alamo has not yielded as high as Mustang or New Nortex because of severe damage by low temperatures in 1951. Alamo is less cold resistant than the other commercial varieties shown and is not recommended for fall seeding in this area.

Alamo is especially well suited to mid-winter or spring seeding in Texas. In the main commercial growing area of North-Central Texas, this period usually occurs from January 15 to February 15. Seeding dates are slightly later in the northwestern part of the State. Table 2 shows that Alamo outyielded present commercial varieties at all locations. At Denton, for a 7-year period, it averaged 65.3 bushels per acre, or 12.3 bushels more than New Nortex, the variety now most commonly grown. Alamo will provide a satisfactory variety for spring seeding throughout this area.

AGRONOMIC CHARACTERISTICS

Summarized data on several agronomic characters of Alamo and five commercial varieties of oats are shown in Table 3. These are grouped into fall and spring-sown Texas tests and fall-sown regional tests. The number of station years shown gives the total number of observations for a particular character.

Test Weight

Alamo has a plump, red, medium-size kernel that is predominately awnless and produces grain of attractive appearance and high test weight. In 30 tests from fall seeding, Alamo averaged 32.0 pounds per bushel, Mustang 30.0 pounds and New Nortex only 28.1 pounds. From spring seeding, the advantage of Alamo in test weight is even greater. In 19 tests, Alamo averaged 31.5 pounds, Mustang 28.8 pounds and New Nortex 25.8 pounds. The Red Rustproof strains are later maturing, therefore they often are injured by rusts or high temperatures when spring-sown. Similar results were obtained in the regional tests.

Maturity

At Texas stations, fall-sown Alamo oats headed 2 days earlier than Mustang, 6 days earlier than New Nortex, and ripened 3 days earlier than Mustang and 5 days earlier than New Nortex. When spring-sown, Alamo headed 2 days earlier than Mustang and 7 days earlier than New Nortex, and carried this same earliness through to maturity.

Winter-hardiness

Alamo is not sufficiently cold resistant to be seeded safely in the fall north of the Austin area of Central Texas. In 11 tests where winter-killing occurred, Alamo survived an average of 28.5 percent as compared with 69.2 percent for New Nortex and 86.6 percent for Mustang. In 35 observations in regional tests, Alamo averaged 55.0 percent and Mustang 81.6 percent.

Reaction to Diseases

During the testing period, Alamo has been resistant to the prevailing races of crown and stem rust in Texas. Greenhouse tests and observations in other growing areas of the United States show that this variety is susceptible to race

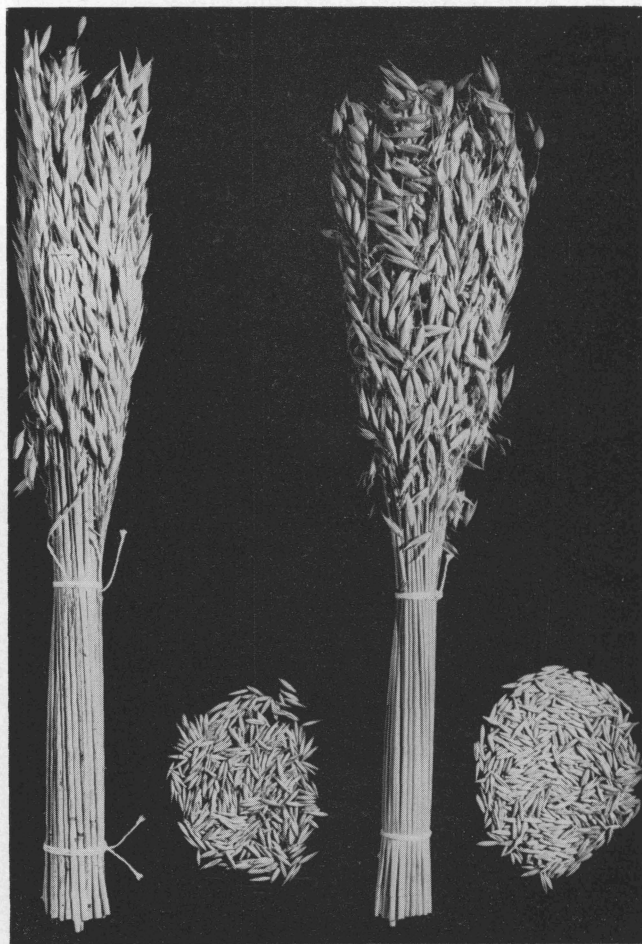


Figure 1. Alamo oats (right) was not damaged by stem rust, while Fultex (left) was damaged and the seed shriveled.



Figure 2. Three plants at the right were damaged by *Helminthosporium* blight, as contrasted with a normal plant at the left.

213 (101) of crown rust and to race 7a of stem rust. In 13 test locations where crown rust notes were taken, Alamo showed an average infection of less than 1.0 percent, whereas New Nortex averaged 26.2 percent and Frazier 54.5 percent. Similar percentages were observed in spring seedings. Observations on percentage of stem rust infection were made in 14 tests and Alamo averaged only a trace of infection as compared with 19.8 percent for New Nortex and 20.3 percent for Frazier. Similar observations were recorded in spring-sown tests. Unless new races which can attack Alamo

become established in Texas, this new variety should give good protection from losses caused by these diseases. Figure 1 shows the reaction of Alamo in comparison with that of Fultex.

Alamo is susceptible to *Helminthosporium* blight, a disease caused by a seed and soil-borne organism which may attack the plant from the seedling stage until near maturity. The roots of the plant are attacked and destroyed, resulting in a reduction in stand, reduced vigor of plants and finally reduced yields and quality of grain. The disease is favored by warm, humid weather, hence, it is more prevalent in South Texas. Because of the danger of damage by this disease, farmers are warned against seeding Alamo oats on the same land repeatedly, whether the crop is to be used for grain or pasture. Seed should be graded carefully and then treated with Ceresan M or other approved seed disinfectant. Rotation of crops is important in the control of this disease. Figure 2 shows a plant damaged by *Helminthosporium* blight in comparison with a normal plant.

Growth Characteristics

Alamo has a strong, stiff straw that enables it to stand for direct combining under many conditions. Observations at a number of stations indicate it usually lodges less than most varieties. Figure 3 shows a fine plot of Alamo oats at Denton in 1953.

The early growth habit of Alamo is much like that of true spring-type oats, being rather upright in habit and having a broad leaf. Because



Figure 3. Alamo oats (left) in comparison with New Nortex (right).

of this erect growth habit, it may be damaged by close or early grazing of livestock. In clipping tests at several southern stations, Alamo produced very high yields of forage and, when properly managed, was not damaged by grazing. Because of its early maturity, it should not be grazed as late in the spring as Red Rustproof if a grain crop is to be matured.

The erect growth habit of Alamo also lends itself to seeding as a companion with spring-sown sweetclover. Its early maturity also favors the establishment of clover. Figure 4 shows a stand of sweetclover growing in a field of Alamo oats.

ACKNOWLEDGMENTS

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Figure 4. Alamo oats in which sweetclover has been sown as a companion crop.