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BULLETIN 436
MARCH 1954

*Waubay
and
Dupree*

**TWO NEW OATS
for SOUTH DAKOTA**



AGRONOMY DEPARTMENT
Agricultural Experiment Station
SOUTH DAKOTA STATE COLLEGE

Dupree and Waubay

TWO NEW OATS FOR SOUTH DAKOTA

By V. A. DIRKS¹

DUPREE AND WAUBAY are two new oat varieties for South Dakota with a limited area of adaptation: Dupree for the central and western part of the state, and Waubay for the eastern, especially the northeastern, section. Within these areas, these varieties should make a valuable contribution to the stability of farm operations.

Dupree

Origin: Dupree (C.I. 4672) is a selection made at the Kansas Experiment Station in cooperation with the Agricultural Research Service, USDA. It was derived from the cross of two hybrid selections: (Anthony x Bond) and (Richland x Fulghum). The latter selection had been outstanding for drouth resistance. Dupree was introduced to South Dakota in the Uniform Nursery program in 1948, and its vigor, earliness and yielding ability indicated it to be a desirable type for central South Dakota. Since 1949, Dupree has been tested at the substations as well as the main station and, since 1951 at Newell. The variety was named for a town in western South Dakota which is in the center of a good farming area.

Description: Dupree is a very early oat, one to two days later than Brunker. It is a fairly fine-stemmed type, of moderate height. The foliage is light green, the grain is yellow and the test weight is above average for a western type oat. Du-

pree has unusual vigor, but, like most dry-land oat types, it is likely to lodge under excessively humid conditions. The agronomic characteristics of Dupree in comparison with some standard varieties are given in Table 1.

Disease Resistance: Dupree carries the Anthony type of stem rust resistance, which involves resistance to race 8 of oat stem rust. It also carries a modified Bond type of leaf rust resistance—more or less similar to that of Clinton or Nemaha except that Dupree is less susceptible to race 45 of crown rust than Clinton. Dupree is resistant to Victoria blight and has shown itself to be intermediate in its reaction to Septoria at Brookings in 1953. This variety has a high level of smut resistance, good resistance to halo blight, and appeared to have an intermediate reaction to red leaf, a virus disease, in 1950. The earliness of Dupree may give it consid-

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Table 1. Average Plant and Seed Characteristics of Dupree, Andrew, Clinton, Vikota and Brunker Oats Grown at Brookings, 1949-53

Variety	Date Headed	Date Ripe	Height, Inches	Degree of Lodging	Test Wt. Lbs./Bu.	Percent Stem Rust	Percent Leaf Rust	Halo* Blight	Septoria* Rating	Red Leaf* Rating
Dupree	6-17	7-21	33	37	34.5	8	23	1	7.5	3
Andrew	6-16	7-20	35	16	34.8	3	30	2	9.0	5
Clinton	6-20	7-22	36	30	35.0	9	40	2	10.0	5
Vikota	6-21	7-22	32	28	34.5	1	5	3	1.5	6
Brunker	6-15	7-19	32	48	33.9	12	15	3	10.0	3

*Notes on halo blight are for 1952 only; Septoria ratings for 1953 and red leaf for 1950. The reaction of these varieties to these three diseases is given on a scale of 1 to 10, where 1 is the most resistant, 10, the most susceptible.

erable escape value from some diseases.

Drouth Resistance: Artificial drouth tests conducted at the Experiment Station at Brookings in 1953-54 indicate that Dupree has a high order of heat resistance and is able to survive and recover after exposure to temperatures of 118° for 12-hour periods. This was in accordance with earlier Kansas studies which showed that this variety had much drouth resistance. Yields at the substations under dry conditions in 1949 and 1950 further indicate that Dupree has ability to yield despite moisture shortage and heat.

Performance: The yield of Dupree in South Dakota yield trials during 1949-53 is given in Table 2. Since the variety was chosen on the basis of its 1948 performance at Brookings, the 1948 yield is not included in the averages. It will be seen from the data in Table 2 that Dupree exceeded the yield of Andrew, Vikota, Clinton and Brunker at all stations except Brookings.

However, the yield averages are not the entire story. Table 3 shows the performance of Dupree for all tests where drouth and high temperatures were yield limiting factors, as well as for tests where lodging and excess rainfall occurred.

Table 2. Average Yields of Dupree Compared with Four Standard Common Oat Varieties Grown at Five Locations in South Dakota, 1949-53

Variety	Brookings	Highmore	Eureka	Cotton-	Newell†	Newell‡
	1949-53	1949-53	1949-53	wood* 1949-53	Dry-land 1951-53	Irrigation 1951-53
	Bu./A.	Bu./A.	Bu./A.	Bu./A.	Bu./A.	Bu./A.
Dupree	75.7	53.1	57.1	51.6	49.0	89.4
Andrew	81.0	50.2	53.5	47.7	48.6	80.3
Clinton	77.4	46.0	52.9	45.8	—	—
Vikota	83.0	52.1	57.0	45.8	—	84.8
Brunker	73.1	44.1	46.5	49.5	48.4	73.4
Least significant difference	4.2	3.7	4.3	5.2	3.2	5.3

*1951 crop lost from soil blowing; 1951 not included in average.

†All data on Newell dry-land furnished by A. Osenbrug, Agricultural Research Service, U. S. Dry-land and Irrigation Field Station, Newell, S. D.

‡All data on Newell irrigation furnished by J. L. Bonneman, Agricultural Research Service, U. S. Dry-land and Irrigation Field Station, Newell, S. D.

Table 3. Average Yields of Dupree Compared with Four Standard Varieties of Common Oats Under Both Limited and Abundant Moisture Conditions

Limited Moisture Conditions: 1949, 1950 and 1952						
Variety	Brookings		Highmore	Eureka	Cottonwood	Average
	Bu./A.	Bu./A.	Bu./A.	Bu./A.	Bu./A.	12 Tests
Dupree	75.3	34.8	37.8	48.1	49.0	
Andrew	77.0	32.1	37.5	42.6	47.3	
Clinton	71.4	29.8	37.4	39.8	44.6	
Vikota	75.7	33.0	39.8	41.8	47.6	
Brunker	71.5	30.3	32.2	42.7	44.2	
Least significant difference	4.1	3.3	4.6	5.7	2.3	

Abundant Moisture Conditions: 1951 and 1953						
Variety	Brookings		Highmore	Eureka	Cottonwood	Average
	Bu./A.	Bu./A.	Bu./A.	Bu./A.	Bu./A.	7 Tests
Dupree	76.4	80.4	86.0	61.8	78.2	
Andrew	87.1	77.2	77.4	63.0	78.1	
Clinton	86.2	70.4	76.0	63.5	75.5	
Vikota	94.0	80.7	82.6	69.8	83.5	
Brunker	75.6	65.0	68.1	70.0	69.6	
Least significant difference	8.6	5.4	8.1	14.2	4.8	

Under limited moisture conditions, such as occurred in 1949, 1950 and 1952, Dupree is definitely superior to the standard varieties in western South Dakota. These conditions are much more likely to occur in central and western South Dakota than are conditions of excess rainfall.

The yields of Dupree in years of high moisture indicate that this variety may be penalized because of limited straw strength. However, even under these conditions, its performance is not greatly inferior to

the other varieties. This gives Dupree a distinct advantage over dry-land oats like Brunker, which is heavily penalized in yield in wet years.

An indication of the yield stability of Dupree is given in Table 4. Here the deviation of its yield from the average yield of the varieties recommended for each station is calculated. For example, for the Eureka area in 1953, the recommended varieties were Vikota, Andrew, Marion, Cherokee, Nemaha and

Table 4. Yield Difference in Bushels per Acre Between Dupree and the Average of the Common Oat Varieties Recommended for the Specific Area, as Measured at South Dakota Locations, 1949-53

Location	Difference in Bushels per Acre				
	1949	1950	1951	1952	1953
Brookings	8.9**	6.4*	-5.0	-2.6	-6.4
Highmore	5.5	4.9**	1.0	5.0	5.1
Eureka	-0.1	-3.6	7.7	-1.2	9.8*
Cottonwood	8.5**	2.4†	6.0	-6.2
Newell Dry-land				2.5	0.5
Newell Irrigation				10.7	7.8

†Blanks indicate no results that year at that station.

*Denotes significant difference at 5% level.

**Denotes significant difference at 1% level.

Mo. 0-205. The average yield of these six varieties was 68.8 bushels per acre; Dupree at Eureka in 1953 yielded 78.6 bushels per acre, a deviation of +9.8 bushels over the average of the recommended varieties. Table 4 summarizes the annual deviations calculated in this manner for the experimental locations. In no case was Dupree statistically inferior to the average of the recommended varieties for any given location at any given year. The recommended varieties have been changed to meet changing situations of climate and diseases, and the continuous performance of a single variety in comparison with a selected group of standards is indicative of a high level of adaptation.

Several oat varieties have become important in the last two years. Of these, Mo. 0-205 appears to have a wide area of adaptation and an unusually high yield level. Dupree has been inferior to Mo. 0-205 at Brookings, but elsewhere, the yields of the two varieties have been extremely close, indicating that in the central and western areas of the state, Dupree might be a very useful alternative to Mo. 0-205, with a different form of disease resistance and a lighter grain color.

Summary: The extreme earliness of Dupree is a strong asset for this variety in the central and western areas of the state. While its standability is entirely satisfactory in this area, it does not appear sufficiently stiff-strawed to be very desirable in the eastern, higher rainfall sections of South Dakota. Plant diseases are not generally as severe in the central and western parts of the state as in the east; the limiting factors are heat and drought.

Regionally, Dupree has been tested for four years. In all four of these it has had one of the highest average yields of the 25 varieties in these trials. The regional results indicate that Dupree has its greatest advantage over other varieties under dry conditions, while under humid conditions, stiffer strawed varieties are superior.

These considerations have prompted recommendation and distribution of Dupree to the central and western counties of the state. Nearly one thousand bushels were distributed to County Crop Improvement Associations in this area in March, 1954. Allocations by counties were made on the basis of the existing oat acreage and the adaptation of the variety.

Waubay

Origin: Waubay (C.I. 5440) is a selection from a cross of Clinton x Marion made by Dr. F. A. Coffman of the Agricultural Research Service, USDA. The purpose of the cross was to combine the stiffness of straw, high test weight and disease resistance of Clinton with the all around adaptability and crown rust tolerance of Marion. Several selections were made from this cross; Waubay is one of four that have been increased and released as varieties. Of all the selections increased, Waubay has the stiffest straw. This variety has been tested in South Dakota since 1950. It takes its name from a town and lake in the north-eastern part of the state, located in the area to which the variety appears primarily adapted.

Description: Waubay is a fairly late oat variety—often one to two days later than Clinton. It has a sturdy, stiff straw, is about three inches taller than Clinton, and has a deep green foliage. The color of the grain is a light yellow. The agronomic characteristics of Waubay in comparison with Clinton, Marion and Shelby are listed in Table 5.

Disease Resistance: Waubay carries the Richland factor for stem rust resistance, which means that it is resistant to race 7 of oat stem rust but susceptible to race 8. It carries the Marion form of leaf rust tolerance. Waubay appears intermediate in its reaction to Septoria and halo blight, as well as to red leaf. It appears to have a fairly high level of smut resistance, as reported in the Uniform Nursery trials.

Drouth Resistance: Artificial drouth tests run on Waubay indicate that this variety is by no means as drouth resistant as Dupree. It was not extremely susceptible to heat injury, but was intermediate in its reaction. This is borne out by the lower yields of Waubay in the western areas of the state.

Performance: The yields of Waubay in comparison with its parent varieties and Shelby and Andrew are given in Table 6 with four years' data at Brookings, and two years' results at the substations. It will be seen that the yields of Waubay are fairly close to those of Marion. Since the yield performance of Marion has been very acceptable, the value

Table 5. Average Plant and Seed Characteristics of Waubay, Clinton, Marion and Shelby Oats Grown at Brookings, 1950-53

Variety	Date Headed	Date Ripe	Height Inches	Degree of Lodging	Test Wt. Lbs./Bu.	Percent Stem Rust	Percent Leaf Rust	Halo* Blight	Septoria* Rating	Red Leaf* Rating
Waubay	6-24	7-29	39	35	35.0	15	46	3	8.0	4
Clinton	6-24	7-27	38	38	34.7	15	50	2	10.0	5
Marion	6-24	7-29	39	41	34.0	6	45	3	7.5	1
Shelby	6-28	7-31	40	39	35.2	21	49	6	10.0	3

*Notes on halo blight are for 1952 only; Septoria ratings for 1953 and red leaf for 1950. The reaction of these varieties to these three diseases is given on a scale of 1 to 10, where 1 is the most resistant, 10, the most susceptible.

of Waubay may be considered primarily as a stiffer strawed replacement for Marion, although the two varieties are not entirely similar. In the Uniform Nursery trials throughout the North Central Region, under a great range of conditions, Waubay has yielded 111 percent of Clinton and 105 percent of Marion over a 4-year period. In these trials it has been markedly superior to Marion in straw strength, and even slightly excelled Clinton.

Summary: Since Waubay may be expected to do well wherever Marion has done well, its area of adaptation would be limited primarily to

the northeast corner of the state. It does not appear suited to the central and western areas which require an earlier oat with a more limited type of vegetative growth. Consequently, Waubay is recommended only for the eastern part of the state, and especially the northeast.

Nearly 1500 bushels of Waubay have been distributed for 1954 seeding in this area. Distribution was through the Foundation Seed Stocks Division to the County Crop Improvement Association. County allotments were based on past oat acreages and adaptation to the area.

Table 6. Average Yields of Waubay Compared with Parent Varieties, Clinton and Marion and with A Late and an Early Check Variety at Four South Dakota Locations, 1950-53.

Variety	Brookings	Highmore	Eureka	Cottonwood
	1950-53	1953	1952-53	1952-53
	Bu./A.	Bu./A.	Bu./A.	Bu./A.
Waubay	89.5	74.4	63.8	59.8
Clinton	82.6	65.1	57.8	62.8
Marion	83.9	73.8	71.0	65.8
Shelby	80.6	66.2	60.3	60.8
Andrew	84.9	78.6	68.6	63.6
Least significant difference	6.0	10.7	7.0	9.3