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BINGHAM OATS*

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Stiff straw and high yield potential are the outstanding attributes of Bingham oats. It is similar to Overland in general characteristics, but it is later, has greater yielding ability, stiffer straw and more disease resistance. Bingham was tested and developed through the cooperative efforts of several state experiment stations and the U. S. Department of Agriculture.

Development

Bingham is one of 17 selections from a multiple cross involving several varieties and selections. Its parentage is (Cleo x Garry) x [(Bonda x Hajira-Joanette x Santa Fe) x Mo. 0-205]. The crosses and subsequent selections were made by F. A. Coffman and associates at the University of Idaho Experiment Station at Aberdeen. The final cross in the series was X56CE made in the field at Aberdeen in 1956. The F_1 and F_3 generations were grown in the greenhouse during the subsequent winter seasons at Beltsville, Md., while the F_2 and F_4 generations were grown at Aberdeen in the summer seasons of 1957 and 1958. The final selection, an F_4 panicle row designated as 58Ab-2773, was later named Bingham. It was assigned the C. I. number, 7588¹, in 1960. Seed from this row was grown in a preliminary test at Aberdeen in 1959 along with 16 other selections of the same parentage.

*Joint contribution from the Idaho Agricultural Experiment Station and the Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture.

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¹ C. I. refers to the accession number assigned by the Crops Research Division, U. S. Department of Agriculture.



The author, Frank Petr, stands at the edge of a 20-acre field of 1965-crop Bingham oats growing on the Aberdeen Branch Station.

Performance

Bingham has been tested at several locations in Idaho since 1959. In 1960 it was included in the regional nursery for testing at 11 irrigated locations in the western states. In 1961 it was included in the non-irrigated regional nursery at 10 locations. Tables 1-5 give its yield, performance and quality characteristics in Idaho. Tables 6 and 7 give its average yield and quality on a regional basis. Its excellent performance over a wide range of conditions in the western region indicates its adaptability to different soil types and to varying seasonal conditions in Idaho.

Tables 1-3 summarize agronomic data obtained at Aberdeen and Twin Falls under irrigation over a 6-year period. At Aberdeen, Bingham yielded about 5 bushels per acre more than Park and 12 bushels per acre more than Overland. At Twin Falls, Bingham outyielded Park by 9.6 bushels and Overland by 7.6 bushels per acre. The test weight of Bingham averaged from 1 to 1.5 pounds less than Overland and Park at the two locations. During a 5-year period at Aberdeen, Bingham headed 1 day later than Park and 4 days later than Overland.

Table 1. Yield and test weight of Bingham compared with other selected oat varieties grown under irrigation at Aberdeen and Twin Falls.

Variety	Aberdeen ¹	Twin Falls ²	Average
Yielding ability, bushels per acre			
1960-65, inclusive (6 years)			
Bingham	181.4	156.8	169.1
Park	176.5	147.2	161.8
Overland	168.6	149.2	158.9
Victory	164.2	126.2	145.2
Test weight, pounds per bushel			
1960-1965, inclusive (6 years)			
Bingham	37.5	36.2	36.8
Park	39.0	37.5	38.2
Overland	38.4	37.6	38.0
Victory	39.5	39.3	39.4

¹ The assistance of Harland Stevens, Senior USDA Agronomist (retired) and to E. W. Owens, Superintendent, Aberdeen Branch Experiment Station, for their part in obtaining the Aberdeen data is gratefully acknowledged.

² The cooperation of Marshall LeBaron, Superintendent, Twin Falls Branch Experiment Station, in providing facilities and assistance for the Twin Falls tests is acknowledged.

Bingham averaged 1 inch taller than Park and 5 inches taller than Overland based on a 6-season average at Aberdeen. Bingham has a very satisfactory record for lodging resistance. Over a 5-year period it averaged only 2 percent lodging as compared to 6, 7 and 28 percent for Park, Overland and Victory, respectively.

A summary of the performance of Bingham under non-irrigated conditions at Moscow, Idaho, compares well with Park and Overland for yield, but on the basis of 4 years' data, it was outyielded by Marida (Table 4). As in the irrigated tests, Bingham was lower in test weight than the currently recommended varieties.

Table 2. The agronomic characteristics of Bingham compared with other selected oat varieties grown under irrigation at Aberdeen.

	Heading date 1961-1965 (5 years)	Height, inches 1960-1965 (6 years)	Lodging, % 1960 1962-1965 (5 years)
Bingham	6-30	44	2
Park	6-29	43	6
Overland	6-26	39	7
Victory	7- 1	50	28

Table 3. The reaction to disease displayed by Bingham and other selected oat varieties grown under irrigation at Aberdeen and Twin Falls.

	Covered Smut Race A-576	Stem rust Race 8 ¹	Victoria blight ¹	Red leaf
Bingham	31	R	R	trace
Park	14	S	S	medium
Overland	0	S	S	trace
Victory	S	S	R	trace-med.

¹S=susceptible, R=resistant

Table 4. Performance of Bingham in comparison to currently recommended oat varieties grown on non-irrigated land at Moscow, Idaho.¹

	Yield bu./A.	Test weight lb./bu.	Height in.	Heading date
4-year average				
Bingham	105.2	35.8	41	7-12
Park	100.7	36.8	42	7-11
Overland	99.2	37.0	37	7- 5
Marida	108.5	36.7	42	7- 9
5-year average				
Bingham	105.5	35.0	41	7-13
Park	103.8	36.5	42	7-11
Overland	104.8	36.6	37	7- 6

¹ K. H. W. Klages, Department Head (retired), Idaho Agricultural Experiment Station, Moscow, Idaho, deserves thanks for supplying data.

Table 5 shows how Bingham performed on dry land at Tetonia. On the basis of 6 years' data, it produced yields equal to or exceeding the currently grown varieties but was slightly lower in test weight. Its late maturity, however, may be a disadvantage in dry years.

Tables 6 and 7 summarize the performance of Bingham at irrigated and non-irrigated locations in northwestern United States. Bingham compared favorably to the check varieties in yield at non-irrigated locations and outyielded the checks by 4 to 15 bushels per acre under irrigation. Although it was lower in test weight than the checks, its quality is satisfactory. Bingham was outstanding in resistance to lodging at irrigated locations and about equal to Park at non-irrigated stations. It averaged slightly taller than Park and approximately 2 inches taller than Overland.

Table 5. Performance of Bingham compared with currently recommended oat varieties grown on dry land at Tetonía, Idaho.¹

Variety	Yield bu./A.†	Test weight lb./bu.†	Heading date†	Growth percentage†	Height in.††
Bingham	44.4	33.9	7-28	67.0	29
Park	44.0	33.5	7-27	66.3	30
Overland	41.0	34.8	7-21	67.7	27
Marida	38.4	33.8	7-20	68.7	30

¹ Hugh McKay, Superintendent, Tetonía Branch Experiment Station, supplied facilities and technical assistance in growing the nursery and collecting data.

† 6-year average

†† 2-year average

Description of Plant and Seed

Bingham is an oat of medium height, generally about 42 inches tall under average conditions, and usually within the range of 36 to 48 inches. It is very resistant to lodging even under conditions of high fertility and moisture. Bingham has erect early growth typical of spring oat varieties. The foliage prior to heading has a dark green color and upright leaves. After heading, the plants are a definite gray-green, resulting from a waxy glaucous substance on the leaf surface. Prior to panicle emergence, the erect short and mid-wide flag leaves become evident. The lower leaves of Bingham are mid-wide and are of medium length. The culms are of medium length and thickness. No pubescence occurs at the nodes or on the leaf sheaths and margins.

The panicle of Bingham is equilateral (tree-like) with medium short pedicels. The rachis is straight and rather stiff. Usually about 50 spikelets are formed on a panicle. Under normal conditions the spikelets produce 3 florets or seeds which are rather plump and medium in length. The lemma and palea (hull covering the groat) are white. Occasionally straight awns occur on the lemma. The rachilla, which joins the secondary floret to the primary floret, is medium in length and width. Separation of the florets and of the primary floret from the spikelet is by fracture which is typical of oats classed as *Avena sativa*.

Bingham has plump white kernels usually averaging about 30 grams per 1000 as compared to 28 grams per 1000 for Overland and 31 grams per 1000 for the Park variety.

Table 6. Performance of irrigated Bingham oats grown at northwestern regional nursery locations compared to standard varieties from 1960-1965, inclusive.

Variety	Yield bu./A. 50 sta.yrs.	Test weight lb./bu. 49 sta.yrs.	Heading date 36 sta. yrs.	Height in 36 sta.yrs.	Lodging % 16 sta.yrs.
Bingham	130.4	35.7	6-29	39.8	2.5
Park	126.3	37.2	6-28	39.6	6.6
Overland	121.6	37.6	6-25	37.5	9.6
Bannock	122.4	38.0	6-29	42.9	33.0
Victory	115.9	38.4	6-30	45.2	29.3

Bingham is resistant to race 8 of stem rust (*Puccinia graminis avenae*) which is the most common race occurring in Idaho and other northwestern states. It also carries resistance to Victoria blight caused by *Helminthosporium victoriae* Meehan and Murphy. Park and Overland are both susceptible to race 8 of stem rust and to Victoria blight. The latter disease could become a problem in some parts of Idaho if oats were grown more intensively. Bingham has adequate resistance to 5 of the 6 key races of smut occurring in the United States. It is about equal to Park in its moderate resistance to red leaf caused by the barley yellow dwarf virus. Bingham is not resistant to crown rust (*Puccinia coronata*), but this disease does not occur in the area of the United States west of the Great Plains. This is partly due to climatic conditions, to the absence of the alternate host (*Rhamnus* or Buckthorn) of the crown rust organism and to the prevailing westerly winds which may preclude the movement of urediospores from the southern oat producing area where crown rust occurs regularly.

Table 7. Performance of non-irrigated Bingham oats grown at northwestern regional nursery locations compared to standard varieties from 1960-1965, inclusive.

Variety	Yield bu./A. 43 sta.yrs.	Test weight lb./bu. 41 sta.yrs.	Heading date 41 sta.yrs.	Height in 35 sta.yrs.	Lodging % 9 sta.yrs.
Bingham	70.2	32.2	7- 4	36.4	70.0
Park	71.3	34.3	7- 3	35.7	8.8
Overland	70.8	34.9	6-29	33.6	2.4
Bannock	70.3	34.2	7- 3	37.1	37.6
Victory	68.1	34.5	7- 5	40.3	26.6

Recommendations

The following recommendations are made to potential growers of Bingham oats:

1. The yield advantage of Bingham over other varieties is greatest when grown on fertile land with ample available moisture.
2. As Bingham is of medium-late maturity, it should be planted early.
3. For best results Bingham should be planted at a rate of 80-100 pounds per acre. This is equivalent to 25 or 30 seeds per square foot or 12 to 15 seeds per foot of a 6-inch drill row.
4. Irrigation should be applied as needed to insure optimum growth without moisture stress until the groat is well developed. Then further irrigation should be withheld completely to aid in rapid ripening and to prevent second growth.

Summary

Bingham oats will be released to certified seed growers in Idaho in 1966. It is recommended for production in irrigated areas and the more humid non-irrigated areas of the state. Its outstanding attributes are stiff straw and excellent yielding ability. Bingham is resistant to most races of loose smut. It has resistance to Victoria blight and to race 8 of stem rust.

Bingham has a medium length, plump, white kernel with quality similar to Park, although its test weight is lower. Bingham averages 2 inches taller than Park and 5 inches taller than Overland. It heads about a day later than Park and approximately 5 days later than Overland.

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