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NATIONAL OAT NEWSLETTER

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Sponsored by the National Oat Conference

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I. THE NATIONAL OAT CONFERENCE

Secretary's Report National Oat Conference Committee
January 31, 1953 to February 1, 1954

During the year the National Oat Conference Committee held no general conference. In December, however, it conducted an election by mail in which Neal F. Jensen was re-elected to serve as Committee Chairman for the year 1954.

Several changes in Committee membership occurred during the year. The membership as of February 1, 1954 is as follows: Neal F. Jensen and Lincoln H. Taylor represent the Northeastern Region; J. M. Poehlman, Kenneth Frey, and Elmer Heyne, the North Central Region; D. W. Robertson is as yet the only member from the Northwestern Region; the Southern Region representatives are I. M. Atkins and Darrell Morey; H. A. Rodenhiser and H. C. Murphy, respectively, represent the Cereal Section and the Oat Project of the U. S. Department of Agriculture; and the undersigned is Secretary to the Committee.

During the year Volume III of National Oat Newsletter was published under the sponsorship of the National Oat Conference. The publication for 1952 included 70 pages. Neal F. Jensen was again editor, and another very interesting, neatly presented, creditable publication resulted, thanks to his efforts. This publication has proved of much value and interest to oat breeders and others. The oat workers of the country are again indebted to the Quaker Oats Company of Chicago, Illinois, for very generously bearing the costs of the publication.

Although no general meeting was called in 1953, two sectional meetings were held during the year January 31, 1953 to February 1, 1954. Agronomists of the South interested in Oats attended a sectional program in connection with the meetings of the S-13 Committee which was held at the same time as the Southern Agricultural Workers' Meetings at Hotel Jung, New Orleans, Louisiana, February 9 to 11, 1953. Some 30 agronomists and pathologists interested in oats attended those meetings. D. A. Reid was Chairman; H. R. Rosen, Secretary; and I. L. Forbes, Administrative Advisor.

The second sectional meeting was the North Central Oat Technical Committee Meeting held at Purdue University, Lafayette, Indiana, January 8 to 9, 1954. Nearly 40 agronomists and pathologists attended, with H. L. Shands, Chairman; K. J. Frey, Secretary; and T. H. Fenske, Advisor.

Franklin A. Coffman, Secretary

* * * * * * * * * * * *

Report on the North Central Oat Technical Committee Meeting

By K. J. Frey, Secretary

The 1954 meeting of the North Central Oat Technical Committee was held at Purdue University, on January 8 and 9, 1954. About thirty-five research workers representing twelve mid-western states and the United States Department of Agriculture were in attendance. The morning session of January 9 was devoted to the presentation of papers upon research work either completed or in progress, in the north central region during the past two years. Given were papers on the morphological development of plants, the inheritance of fluorescence of oat seed, breeding for low nitrogen requirement in oats, testing for straw stiffness, variability of oat strains extracted from the succeeding generations of backcrossing, interspecific hybrids in the genus Avena, and inheritance of rust resistance in oats. The afternoon session of January 8 was devoted largely to a discussion of uniform nurseries, and reports from the state workers. These reports were brief and in general gave only the picture of oat production in 1953. A number of new varieties are being released in the midwestern regions this year, including CI5441 from Michigan CI 5440 and CI 4672 from South Dakota. North Dakota had an increase of CI 5927 and Minnesota has a winter increase of CI 6765. Dr. Bonnett gave some data, indicating that single hills may be used for yield testing. The Indiana station presented data, which indicated that emasculated wheat flowers are still receptive to pollination and fertilization after three weeks storage at 34 to 37 degrees F. Friday evening was devoted to a discussion of the general policy of experiment stations, toward varietal release. There was a great deal of controversy among the research workers concerning the desirability of having a large vs. small number of oat varieties released and recommended by experiment stations. The Saturday morning session was devoted partially to a discussion of oat pathological studies. The diseases discussed were red leaf, blue dwarf, oat smut, stem and crown rust, and physiologic scald of oats.

The North Central Technical Committee recommended to the National Oat Conference that the 1954 meeting should be held prior to the regular meetings of the American Society of Agronomy. It was also suggested that a one-half day session, devoted to oat papers should be arranged as a regular part of the Plant Breeding and Genetics Section meetings.

A very enlightening time was had by all in attendance at the North Central Oat Technical Committee Meeting. We wish to express our thanks to the Purdue workers for the excellent provisions that they made for our meeting. After the formal meeting had closed we all took a tour of the new plant science building and greenhouse at Purdue University. Purdue workers can certainly be very proud of their new facilities.

* * * * * * * * * * *

Monograph Committee Withholds Action

At the National Oat Conference, held at Cincinnati, Ohio in 1952, a committee composed of Dr. J. M. Poehlman, Missouri; Dr. K. J. Frey, Michigan State-Iowa; Dr. H. L. Shands, Wisconsin; and Dr. T. R. Stanton, U. S. Department of Agriculture, was appointed by the chairman, Dr. N. F. Jensen, to investigate the possibilities of preparing an oat monograph. Dr. Poehlman reports that action on a monograph is being withheld in lieu of a pending textbook on oats on which Dr. T. R. Stanton, former Head of the Oat Project, is now working.

By J. M. Poehlman

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II. CONTRIBUTIONS - SPECIAL ARTICLES

Observations on Oats Grown in Yield Nurseries in the Cooperative Coordinated Oat Breeding Program in 1952-53

By F. A. Coffman, H. C. Murphy, and Harland Stevens

During the crop year one or another of the writers visited most of the cooperating states from which data presented herewith were received. The following general conditions were observed:

1. The winter of 1952-53 was so mild that little or no winter killing was observed in fall-sown oats.
2. Droughty conditions affected the crop in Kansas, Oklahoma, Colorado, Nebraska, and Missouri as well as in several New England states. Heat damaged the crop in Illinois.
3. One of the most destructive crown rust epidemics in more than 10 years and the most destructive stem rust epidemics in a quarter century occurred in the North Central States; and oat yields were reduced, especially in Iowa, Wisconsin, and Minnesota.
4. In the Northwestern Region conditions were generally favorable, and oat yields were fully up to average in that region.
5. Data from all Uniform Cooperative Coordinated Oat Yield Nurseries have now been received and summarized, and 1953 results were as follows:

(1) <u>SPRING SOWN NURSERIES GROWN EAST OF THE ROCKIES</u>

Yield Rank	Variety or C.I. No.	Yield (Bu.)	Test (Lbs.)	Height (Ins.)	Lodging %	Date Headed
Northeastern States Nursery (8 Stations)1/						
1	Imp. Garry	59.9	32.6	38.0	2.0	7/8
2	Rodney	58.2	32.8	39.0	5.3	13
3	Garry Sel.	57.5	31.8	38.8	3.3	8
4	Sauk	56.9	33.5	38.2	10.0	9
5	Simcoe	56.9	32.7	40.0	9.5	8

Yield Rank	Variety or C.I. No.	Yield (Bu.)	Test (Lbs.)	Height (Ins.)	Lodging %	Date Headed
North Central States Nursery (16 Stations)						
1	Sauk	69.3	29.5	33.0	41.0	6/23
2	4988 [2]	69.1	32.5	34.0	45.0	18
3	Andrew	68.8	31.6	33.0	43.0	18
4	Simcoe	68.2	29.2	35.0	45.0	22
5	Imp. Garry	67.0	29.6	36.0	26.0	23
Spring Sown Red Oat Nursery (5 Eastern and Southern Stations)						
1	4988	39.1	33.4	30.8	39.0	6/6
2	6625	38.7	33.5	30.7	45.8	6
3	6631	38.5	31.6	28.5	39.0	7
4	5444	38.2	31.1	28.3	13.5	8
5	Andrew	37.8	32.1	30.0	28.8	6
Spring Sown Red Oat Nursery (8 North Central Stations)						
1	5323	62.6	32.2	30.3	49.2	6/7
2	6633	62.5	30.0	26.5	42.0	6
3	6636	60.9	28.7	27.3	43.0	7
4	6619	60.8	29.7	27.0	37.5	6
5	6632	60.6	30.6	26.2	40.7	6
Spring Sown Red Oat Nursery (5 Southwestern Stations)						
1	4988	41.4	29.7	26.0	33.5	5/28
2	6633	41.2	28.5	23.0	3.0	25
3	6632	40.5	28.2	23.3	3.5	25
4	6636	40.5	26.2	23.8	16.0	26
5	Osage	40.0	29.4	22.0	18.0	25

See footnotes at end of manuscript.

(2) SPRING SOWN NURSERIES GROWN IN NORTHWESTERN STATES

Yield Rank	Variety or C.I. No.	Yield (Bu.)	Test (Lbs.)	Height (Ins.)	Lodging %	Date Headed
Northwestern States Irrigated Nursery (12 Stations)						
1	5345	139.2	36.4	43.6	11.3	
2	Park	136.5	36.3	42.4	8.1	
3	5346	135.8	36.5	42.6	7.8	
4	Cody	132.2	35.7	39.5	22.2	
5	3865	129.3	34.4	41.0	27.3	

Yield Rank	Variety or C.I. No.	Yield (Bu.)	Test (Lbs.)	Height (Ins.)	Lodging %	Date Headed
Northwestern States Dryland Nursery (8 Stations)						
1	Craig	88.2	35.1	37.1		
2	6612	87.5	36.3	37.1		
3	Sauk	84.8	35.8	42.4		
4	3865	84.8	34.3	38.9		
5	Park	84.3	35.2	38.7		

(3) FALL SOWN NURSERIES, YIELD, ETC.

Yield Rank	Variety or C.I. No.	Yield (Bu.)	Test (Lbs.)	Height (Ins.)	Lodging %	Date Headed
Special Winter Oat Nursery (19 Stations)						
1	Mustang	82.8	32.5	38.4	25.8	5/17
2	Coy	79.8	32.9	41.2	22.5	12
3	6717	77.7	32.4	38.5	28.8	21
4	Forkedeer	77.1	33.9	40.2	34.6	18
5	6571	76.1	32.6	39.2	20.1	21
Fall Sown Oat Nursery (11 more Northern Stations)						
1	Southland	93.5	32.2	41.9	22.5	4/19
2	Victorgrain	92.2	33.5	42.7	20.0	19
3	Arlington	89.4	33.1	44.8	22.4	23
4	Delair	86.5	34.3	43.9	19.9	13
5	Alamo	86.3	34.3	39.7	18.8	16
Fall Sown Oat Nursery (11 more Southern Stations)						
1	Victorgrain	62.3	30.8	50.3	8.0	4/2
2	5372	59.6	22.7	46.5	39.5	12
3	6719	59.0	28.7	49.0	16.5	12
4	Alamo	56.9	33.0	49.0	27.5	3/30
5	Check Var.	56.7	27.4	52.0	75.0	4/4
Florida-Gulf Coast Oat Nursery (8 Stations)						
1	6744	65.8	31.3	45.1	52.2	4/1
2	6757	57.6	31.4	45.3	28.6	3/29
3	Victorgrain	57.2	30.9	46.3	44.0	4/2
4	5930	54.6	28.6	45.7	19.8	1
5	Southland	53.7	30.0	44.6	45.2	2

Yield Rank	Variety or C.I. No.	Forage 3/ Fall	Forage 3/ Spring	Type Early Growth 4/ Range
(4) FALL SOWN NURSERIES, FORAGE RATING AND GROWTH TYPE				
Special Winter Oat Nursery				
1	Mustang	95.8	105.9	D-I
2	Coy	103.8	111.3	D-U
3	6717	93.2	87.0	D-I
4	Forkedeer	96.2	102.6	D-I
5	6571	89.0	89.6	D-I
Fall Sown Oat Nursery (Northern Stations)				
1	Southland	129.3	112.5	U
2	Victorgrain	112.5	105.8	I-U
3	Arlington	115.5	101.8	I
4	Delair	121.3	119.0	U
5	Alamo	123.0	107.5	U
Fall Sown Oat Nursery (Southern Stations)				
1	Victorgrain	108.2	111.0	D-I
2	5372	98.2	99.8	D-I
3	6719	108.8	107.6	D-I
4	Alamo	111.5	113.3	U
5	Check	113.3	110.9	D-I
Florida-Gulf Coast Oat Nursery				
1	6744	117.8	116.8	U
2	6757	111.0	109.8	D-U
3	Victorgrain	103.3	107.8	D-I
4	5930	113.3	113.2	I-U
5	Southland	120.8	120.2	U

6. For the benefit of those located east of the Rockies who desire to cross spring-sown oats in 1954, the 1953 data apparently indicate that oats having resistance to stem rust race 7 such as Sauk, Improved Garry, Simcoe, Mo. 0-205 (C.I. 4988), and Andrew are the most desirable from the standpoint of yield, test weight, and standing ability. As for earliness, Andrew, C.I. 4988, and certain Andrew x Landhafer strains appeared to head first.
7. To the west of the Rockies, the Clinton x Overland2 backcrosses, including Park, and the variety Cody appear to give most promise for yield on irrigated areas; whereas Craig, Sauk, and C.I. 6612 had good records on dryland stations.

8. Among fall-sown oats Mustang and its sister strains C.I. No's. 6717 and 6571, Coy, and Forkedeer appeared most productive in areas where winterkilling is observed most frequently. Generally speaking, winterkilling in oats was no problem in 1952-53, and the results obtained indicate that to obtain yield, Victorgrain, Southland, Arlington, and Alamo should be considered where hardiness is not a problem. In test weight Alamo and Delair ranked especially high, and in straw strength Victorgrain, C.I. 6719, and Alamo gave the best records. Where earliness is sought in a fall-sown oat, Alamo, Delair, and C.I. 6757 should be considered.
9. From the standpoint of forage production, Coy ranked first in the more northern states; and Southland ranked high on stations in the Piedmont and adjacent areas as well as in the Florida-Gulf Coast Region. Others that rated especially high were Delair, Alamo, Victorgrain, and C.I. No's. 6744 and 5930.

FOOTNOTES

1/ Number of stations shown indicates the greatest number reporting on that particular experiment. Except for yield, usually fewer reported.

2/ Key to parents of spring oat strains designated by C.I. number are as follows: C.I. No's. 4988 and 5323, both called Mo. O-205, Columbia x Victoria-Richland; 6625, Columbia x Marion; 6619, 6631, 6632, 6633, 6636 are from Andrew x Landhafer; 5444, Cherokee Reselection; 5345 and 5346, Clinton x Overland2; 3865, (Victoria-Richland) x Bannock; and 6612, (Bond-Anthony) x Overland. Among winter oats C.I. No's. 6717 and 6571 are sisters of Mustang, (Lee-Victoria) x Fulwin; 5372, (Red Rustproof-Victoria) x Norton; 6719, (Victoria x Hajira-Banner) x (Fulghum-Victoria); 6744, (Victoria x Hajira-Joanette) x (Fulghum-Victoria); 6757, (Fla. 167-Landhafer) x Southland; and 5930, Victorgrain x Landhafer.

3/ Based on check equals 100 percent. In Special Nursery Lee was used as check, whereas Appler was used as the check in the other two fall-sown nurseries.

4/ D--Decumbent; I--Intermediate; U--Upright

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Several Short Articles
By H. C. Murphy (USDA)

The Changing Oat Disease Picture

Dr. E. C. Stakman has frequently referred to plant diseases as "shifty enemies". Oat diseases and races of the oat rusts certainly deserve this dishonorable title. The increase in prevalence and severity of races 8 and 10 of oat stem rust in 1943 and 1944 concurrently with the increase in acreage of the susceptible Victoria - Richland derivatives; the striking appearance of Victoria blight starting in 1945 concurrently with the large acreage of Victoria derived varieties; the correlation between the increase in acreage of Bond derived varieties and the increase in prevalence of race 45 of crown rust; and the dramatic although somewhat delayed increase in prevalence of race 7 of stem rust associated with the increase in acreage of Clinton and other susceptible Bond derivatives afford good examples of the "screening effect" of a large acreage of varieties resistant to one race or disease but susceptible to another. The epihytotics of red leaf and Septoria in the North Central region in 1949 and 1952, respectively, represent increases in prevalence and severity of diseases that previously had been of only minor importance. However, these increases did not appear to be associated with a change-over in oat varieties.

The discovery of race 7A of stem rust in 1952, the known presence of virulent race 6 of stem rust in the New England area, and the discovery by Dr. M. D. Simons (reported in this issue) of a new race of crown rust to which Landhafer and Santa Fe are susceptible, are good indications of additional shifts in the prevalence of races of crown and stem rust which may be anticipated.

We are extremely fortunate in having available several sources of high resistance to these potentially important races of stem and crown rust. Through a back crossing program, it should be possible to quickly incorporate adequate resistance to these races into our better agronomic varieties.

Another bright note is the outstanding performance of Mo. 0-205, Sauk, Branch, Craig, etc., which possess moderate resistance to crown rust. This illustrates the value of adult plant resistance. It remains to be seen whether this type of resistance will be maintained with the anticipated increase in acreage of these varieties.

South American Oat Rust Nurseries

Dr. H. A. Rodenhiser has inaugerated a cooperative uniform oat rust nursery grown in different countries in South America during the past few years. Approximately 375 varieties and selections of oats supplied by various states and the USDA were included in the 1953 nursery. Crown rust readings from Argentina, Brazil, and Chile, and stem rust readings from Argentina have been obtained to date. A complete report of the data obtained from these nurseries will be issued by Dr. Rodenhiser after all of the rust readings have been obtained and summarized.

The preliminery crown rust readings indicate that a race, or races, capable of attacking Landhafer, Santa Fe and Bond were present in Argentina and Brazil, but not in Chile. It is interesting that the races capable of attacking Victoria and its derivatives apparently were not present in Argentina, Brazil and Chile in 1953, while their presence was widespread in previous years. Ukraine and its derivatives continued to afford the best protection from the races that attack Landhafer and Santa Fe. 64q (C.I. No. 2927) from Uruguay and selections of Clinton x Ukraine, Cherokee x Ukraine and $Clinton^2$ x Ark. 674 from Iowa, Kansas, and Indiana, respectively, were outstanding for high resistance to crown rust at all locations.

The stem rust data from Argentina indicate that race 7 was the common race in 1953. Varieties possessing the Richland, Canuck or Garry types of stem rust resistance were uniformily resistant.

Approximately 100 grams of seed will be needed for growing an entry in the 1954 South American uniform oat rust nursery. It will be helpful if the Experiment Stations in the United States and Canada will immediately supply H. C. Murphy, Agronomy Building, Ames, Iowa, with 100 grams of each selection or variety that they wish to have tested in South America for rust resistance. Concurrently a list should be sent giving the entries submitted, parentages, Sel. Nos., C.I. Nos., etc. (C.I. Nos. will be assigned to all entries that have not been accessioned). It will be preferable to include only lines which have not been previously tested in South America. If it is not possible to include all entries submitted the seed will be returned. Please send the seed now.

Agronomic and Pathologic Data for World Collection of Oats Recorded on IBM Cards

All of the available agronomic and pathologic data for the C. I. and P.I. numbers in the USDA world collection of oats have been assembled by Mr. David J. Ward. These data are being coded and recorded on IBM cards at Ames, Iowa. A portion of the data, obtained in Florida and Iowa in 1950 and 1951, were previously recorded on IBM cards at Columbia, Missouri, under the supervision of Dr. J. M. Poehlman. It is expected that the card punching task will be completed for all data by June 30. The cards will be kept on file at Ames, Iowa, and requests for information recorded on the IBM cards will be supplied in so far as funds and facilities permit.

The more important data recorded for the world collection of oats are:

Basic Information

Name   C.I. No.   P.I. No.   Source

Agronomic Data

Growth habit
Winter survival
Date of heading
Date ripe
Maturity
Height
Lodging
Straw strength
Forage value
Winter injury

Pathologic Data

Reaction to:

Crown rust
Stem rust
Loose smut
Red leaf
Mosaic
Victoria blight
H. avenae
Septoria
Anthracnose
Mildew
Halo blight

The locations, years when the world collection strains were grown, and the number of entries for which data on one or more of the above agronomic and pathologic characters were recorded, are listed below.

No.	Location	Year	No. of entries
1	Ames, Iowa	1950	2739
1	" "	1953	4451
2	Gainesville, Florida	1950	2470
2	" "	1951	1596
2	" "	1952	275
2	" "	1953	86
3	Quincy, Florida	1950	2470
3	" "	1951	1596
3	" "	1952	275
3	" "	1953	86
4	Lexington, Kentucky	1950	157
4	" "	1951	1500
4	" "	1952	300
4	" "	1953	1954
5	Fayetteville, Arkansas	1951	1490
6	Statesville, North Carolina	1950	144
6	" " "	1951	2575
6	" " "	1952	1089
6	" " "	1953	86
7	Palmer, Alaska	1951	3874
8	Denton, Texas	1950	144
8	" "	1952	1893
9	East Lansing, Michigan	1951	1200
10	Madison, Wisconsin	1951	3352
11	Stuttgart, Arkansas	1950	156
11	" "	1951	300
12	Experiment, Georgia	1950	144
13	Urbana, Illinois	1950	200
13	" "	1951	259
14	Manhattan, Kansas	1949	113
14	" "	1950	100
14	" "	1951	259

No.	Location	Year	No. of entries
15	St. Paul, Minnesota	1950	304
15	" " "	1951	245
15	" " "	1952	245
16	Columbia, Missouri	1950	144
16	" "	1951	301
17	Stillwater, Oklahoma	1950	144
17	" "	1951	300
18	Lincoln, Nebraska	1949	112
18	" "	1950	100
19	Hartsville, South Carolina	1950	144
		Total	39372

Reaction of Oat Varieties to Crown Rust
in the 1952 Uniform Rust Nurseries

Crown rust infection was sufficiently heavy at 28 locations in the United States where uniform oat rust nurseries were grown in 1953 to obtain crown rust readings.

Floriland, Bondvic, Landhafer, C.I. No. 6745, C.I. No. 6746, Clintland, C.I. No. 6700, Sunland, C.I. No. 6748 and Ukraine had the lowest average crown rust infection coefficients, ranging from 0.7 to 3.7 percent, respectively. C.I. No. 6751, Bond. Minrus, Canuck, Richland and Markton were the most susceptible with average infection coefficients ranging from 15 to 50 percent, respectively.

Each of the 19 new varieties and selections had average infection coefficients below five percent, except C.I. No. 6751, Sauk and C.I. No. 6752, indicating a wealth of resistance to the races of crown rust prevalent in the United States in 1953. The Landhafer derivatives were slightly superior to the Santa Fe, Ukraine and Victoria derivatives in resistance to crown rust.

North Central States Uniform Oat Smut Nursery

A cooperative uniform oat smut nursery consisting of 40 varieties and selections inoculated with a local smut collection was grown at 10 locations in the North Central Region, Montana, in 1953. Anthony, Gothland, Victory, Simcoe, Black Diamond, Clinton^3 x Santa Fe (C.I. No. 6539). Clintafe (C.I. No. 6766), Early Clintafe (C.I. 6749) and Monarch were the most susceptible with average infections percentages at all locations of 49, 24, 21, 16, 16, 13, 11, 10 and 9 respectively. Only one entry, Andrew x Clinton (C.I. No. 5967) was free of smut infection at all locations. Twelve additional agronomic entries had average infection percentages below one percent. Twenty-six of the thirty-one agronomic entries had average infection percentages less than five percent.

Mimeographed copies of the data obtained from the 1952 and 1953 North Central Uniform Oat Smut Nurseries will be supplied upon request.

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Varietal Purity and the Prospect Ahead
by Franklin A. Coffman

The fact that among recently distributed oat varieties some are frequently producing aberrant or "off type" plants is of growing concern, especially to oat breeders, those charged with seed certification work, and to others engaged in making seed laboratory examinations. The existence of this increasing and troublesome problem is widely recognized, but likely the most probable reason for its occurrence is less well known.

Nearly all oat varieties distributed in this country in recent years have resulted from hybridization. Study of their history reveals that most of them have included among their known parents one or several that would be assigned morphologically to the species *Avena byzantina*. Such varieties as Victoria, Bond, Fulghum, Landhafer, Red Rustproof, Trispernia, Joanette, Hajira, Santa Fe, and Markton all appear quite likely to be of *A. byzantina* origin. These varieties were used because each included in its genetic makeup a gene or several genes for resistance to one or another of our prevalent oat diseases. In fact, it appears that factors for disease resistance in oats are found almost exclusively in *A. byzantina*, its derivatives, or probable derivatives.

It has long been known that many varieties of *A. byzantina* frequently give rise to "off types" or aberrants. The extent of this variability in the variety Burt was discussed some 30 years ago. Burt produces among others individuals sometimes previously spoken of as being "*sativa*-like". The present writer considers these not as just "*sativa*-like," but as actually being *A. sativa*; and since they trace their origin to *A. byzantina*, a species commonly accepted as being a derivative of the wild red oat *A. sterilis*, the transition from the wild to the cultivated, as pointed out some ten years ago, seems complete--*A. sterilis* to the often somewhat unstable *A. byzantina* to the truer-breeding *A. sativa*, with *A. fatua*, *A. orientalis*, and *A. nuda* arising during the centuries of the transition from the wild to the cultivated. Reports of the occurrence of aberrants in *A. byzantina* similar to these latter three species have been received even within the past quarter century. It is likely these rather recently observed aberrants approached *A. fatua* less closely in some important characteristics than those aberrants which are similar to the other two species. Further, these are by no means all the types of aberrants that appear in some *A. byzantina* oats. Tall wild-like plants, dwarfs, winter types, very early, very late, chlorotic variations, etc., have been reported. In addition, some varieties of A. byzantina are more subject to natural crossing than were our older A. sativa varieties; consequently, it is seen readily that although varieties of A. byzantina frequently contain desirable genes for disease resistance, some of them are quite definitely characterized by being rather unstable genetically and prone to produce "off types".

In our oat breeding programs of the past quarter century we have been using first one and then another A. byzantina derivative as parents in crosses. In incorporating into our new oats more and more genes for resistance to this and then to that disease, some of us may have been rather unmindful of the fact that our oats were becoming closer and closer to A. byzantina in their entire genetic makeup. As some A. byzantina varieties are prone to produce aberrants, we now are coming to realize that some of our new varieties, actually largely A. byzantina in genetic derivation, lack that genetic stability of those long selected so-called "pure lines" of the A. sativa type grown almost exclusively 20 to 40 years ago.

The still further unpleasant news is that as we go more and more to A. byzantina oats in our quest for disease resistance, logically we can expect our situation with respect to varietal purity and the appearance of "off types" to become even worse. In fact, it begins to appear that we may well begin to reconcile ourselves to the idea of "taking the bitter with the better".

One alternative that appears is for our oat breeders to withhold the new disease-resistant varieties in their test plots until they can select, reselect, and then reselect the reselections for some decades prior to releasing them. The question naturally arises, what about the rusts, root rots, red leafs, and other troubles in our farmers' fields in the meantime?

A second alternative would be to face the situation as realistically as possible; to recognize the fact that a certain and increasing percentage of aberrant plants may well be expected in these new oats, largely A. byzantina in their genetic structure; and then to make adjustments accordingly.

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Interstate Cooperation in Small Grain Breeding in Southeastern United States

By W. H. Chapman, Quincy, Florida; J. G. Moseman, Raleigh, North Carolina; and T. M. Starling, Blacksburg, Virginia

An agronomically adapted variety is dependent on resistance to disease, lodging, and shattering; and on winter hardiness; yield and quality. In Florida, disease resistance contributes more toward productivity in small grains than any of the other characteristics. However, in more northern states winter hardiness or some other character might be more important in a variety.

Several times new and more virulent forms of disease organisms have increased rapidly to destructive proportions. As an example, the prevalence and distribution of different physiological races of crown rust is undergoing the third major change in Florida within the past five years. Several cold winters in recent years have indicated a need for additional winterhardiness in Florida varieties and outbreaks of specific diseases in the northern states of the Southeastern region has suggested that additional disease resistance would be desirable in their varieties. Such conditions cause small grain breeding programs to be regional in scope and suggests a coordinated breeding and testing program for the Southeastern states.

Cooperative testing of early generations of small grain hybrids was discussed at the 1953 meeting of the Technical Committee of the Regional Research Project S-13. It was felt that by taking advantage of natural conditions as well as facilities available for specific testing, much faster progress could be made. Certain practices of the Florida program would augment the breeding programs in the other Southeastern states and these states in turn have services which are of tremendous value of the Florida program.

For the past four years Florida has taken advantage of being able to grow summer crops in Idaho. Early maturity allows hybrid combinations to be made sufficiently early to be harvested in ample time for growing F_1 plants at the Federal Substation at Aberdeen.

Growing two crops a year materially hastens a breeding program; however, this is not possible in the northern sections of the southeastern region. With the addition of a few varieties to the Florida crossing block, hybrid combinations suitable for the northern stations could be made in ample time for planting in Idaho. The Florida workers do not have time to make these crosses, but if breeders in other states would take advantage of a Florida crossing block, they could make sufficient hybrids in a short time.

Several workers have expressed an interest in the method used in Florida to eliminate disease susceptible plants in early generations. The entire nursery of 5-foot rows is planted with alternate two-foot alleys. A row down the middle of this narrow alley is perpendicular to the 5-foot tiers on each side and is planted to a composite mixture of several varieties which are susceptible to prevalent races of crown and stem rust. High annual rainfall, high humidity, and a relatively warm growing season furnish ideal conditions for maximum development of small grain diseases in Florida. Natural infections of crown and leaf rust are usually present by the end of January. This is supplemented by artificial inoculations of several physiological races of crown and stem rust and results in very severe epidemics by the latter part of March. Observation and selection in third and fourth generations grown under these conditions almost assures subsequent plantings of rust resistant material.

During the summer of 1953, 127 F_1 plants grown in Idaho produced approximately 80,000 seed. About 5,500 five-foot rows were space planted at the rate of 10 seed per row. In addition to the heavy rust epidemic, the F_2 nursery is sprayed in the vegetative stage with culm rot and Victoria blight. All susceptible plants are discarded as symptoms appear. This system supplemented with separate disease nurseries has resulted in large number of disease resistant lines.

More northern stations can expect natural infection of crown and stem rust infrequently, however, mosaic infested soil and cold winters afford excellent opportunities for testing early generation material. Hybrid seed grown at Aberdeen during the summer represent less than half of those obtained in Florida during the spring. Neither funds nor facilities permitted all of the hybrid seed to be grown in Idaho. If such had been possible, a large number of F_1 seed could have been divided among the southern states and tested under disease and weather conditions specific to their locality. The interchange of this material for growing and testing in the third generation would afford lines resistant to prevalent diseases and conditions in the southeastern states.

Many of the workers feel that the beginning of a coordinated program for the southeastern region will do much to add to the efficiency of the individual projects. North Carolina, Kentucky, Virginia, Georgia, Mississippi, and Florida have indicated an interest in the program and offered specific facilities for testing a number of lines. It is hoped that the program will be operated more efficiently as it grows and the combined data aid tremendously in the production of better varieties of small grains.

Such a testing program can only be successful if material is freely interchanged between stations. The idea is not new. Dr. H. H. Love of Cornell University wrote the following in the 1936 Yearbook of Agriculture: "It seems to me that much valuable material is wasted or lost due to the fact that there is no thorough coordination between the different stations. I urged that this be considered more than 10 years ago in the hope that materials produced at one station might be tested at other stations".

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The Ever Increasing Frequency of New Physiologic Races of Crown Rust Complicates Southern Oat Breeding for Resistance

By T. R. Stanton, Formerly Senior Agronomist in Charge of Oat Investigations in the Division of Cereal Crops and Diseases, U. S. Department of Agriculture

During very recent years the occurrence of destructive new physiologic races of crown rust at an accelerated rate has created a serious problem in southern oat breeding. New or hitherto unknown races are appearing faster than breeders can hope to develop resistant strains or varieties to replace the old (yet new, relatively speaking) varieties that are susceptible to them.

As a consequence, a situation much to the embarrassment of oat breeders has developed in that there is no longer sufficient time to fully prove the agronomic characteristics or value of promising new resistant strains prior to their increase and distribution. In a few words virulent new races of crown rust are simply developing or appearing so rapidly in nature that breeding for resistance to one race is overlapping breeding for resistance to another. The question might very well be asked, what is the solution of the problem?

Premature release of resistant oats is indicated by the fact that after distribution, new varieties originating from rather wide crosses, are failing to meet standards of seed certification because of obvious variability in certain plant and grain characters. On the other hand, if the distribution of a new oat is held off too long, it may be "out of date" because of new races.

To explain the increasing occurrence of new races of crown rust the belief has been growing that with increased oat culture for both grain and grazing in the deep South this area is becoming the breeding ground for new races, including new races of stem rust as well. The very fact that the production of oats has markedly increased in this area in recent years lends considerable credence to this postulation.

It is known that rust spores overwinter in the deep South, blow northward and infect spring-sown oats in the North. Hence, eventually the growing of winter oats in the south may have to be abandoned if spring oats are to be grown successfully in the North. This would mean the replacing of oats with other feed crops and necessitate considerable readjustment in the agriculture of the deep South.

The writer has held the rather optimistic opinion that sooner or later the occurrence of new races of crown rust would just naturally diminish and thus ease the pressure on breeding. This, however, has not come to pass and must be relegated to the category of wishful thinking, as new races with even greater virulence are now appearing almost annually to further complicate breeding operations.

At some future time it is possible that practical methods of controlling rusts by dusting with sulphur or sulphur compounds may be developed to replace breeding, at least in part, for the control of crown and other rusts. So far the cost of this method of control has made it prohibitive.

There is no question that the continuous appearance of new races of the rusts presents a pathologic problem of considerable magnitude. If they come into being by mutation or natural hybridization these evolutionar processes should be investigated. Again if breeding for resistance has run against a stone wall and much further progress from this method cannot be expected, the breeder should be apprised of the fact.

The time for definite fundamental research in the evolution, pathology, physiology and genetics of so-called physiologic races of the oat rusts seems to be overdue. Probably in recent years pathologists and other plant scientists have had to give too much time to the development of methods of control, including breeding, at the expense of basic research on the organism itself. It also is probable that saving money at the expense of fundamental research in many fields of agriculture has not been good economy.

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Accelerating the Elimination of Rust Susceptible Segregates in Oat Hybrid Populations in the Deep South
By T. R. Stanton

At several deep South Agricultural Experiment Stations the elimination of rust susceptible plants from F_2 oat hybrid populations has been greatly accelerated in recent years. This has resulted from the experience of several southern oat breeders in trying to make breeding more efficient and to assure an almost continuous stream of new rust-resistant lines for advancement to yield-test nurseries each year.

Factors which have contributed to a working system are (1) a climate in which breeding operations are seldom if ever interrupted by losses from winterkilling, (2) a region in which natural rust epiphytotics, especially of crown rust, occur during late fall and through the winter in many seasons, and (3) by supplementing these natural infections with artificially induced epiphytotics that are usually relatively easy to develop. A combination of these factors assures much progress in breeding for resistance to crown rust nearly every year.

It has long been known that crown rust is the No. 1 enemy of successful oat culture in the deep South. This has been demonstrated by the fact that increase in oat culture for both grain and grazing has gone hand in hand with the breeding and distribution of crown rust-resistant varieties with satisfactory agronomic characteristics.

Stem rust presents a similar problem, but destructive infections have occurred rather infrequently and as a result it has been a much less serious limiting factor in deep South oat culture than has crown rust.

Breeding for the rapid development of resistant material has taken on about the following pattern which might be described as "machine-like".

First year: Numerous new (and what are considered as the most potentially desirable) hybrid combinations, based on past experience and prevalent physiologic races of the rusts are effected each spring. The number of new hybrids obtained each year of course depends largely on the skill and experience of the individual hybridizer.

The resulting F_0 or baby hybrid seeds, as soon as sufficiently mature, are harvested, dried and sent, by cooperative agreement, to the Branch Experiment Station (irrigated) at Aberdeen, Idaho for seeding. As a rule the date being rather late for general oat seeding, yet there usually is sufficient time for the F_1 plants to produce some ripe seeds before the occurrence of killing frosts.

The F_0 seeds are space-planted one seed to the hill, one foot apart each way. The F_1 plants are harvested, usually by just clipping off the panicles, placing those from each F_1 plant in an individual harvesting envelope and then forwarding to the respective originating station.

The seed from each F_1 plant is then space-planted in a special F_2 plant population nursery with an occasional row sown to the parent varieties or strains as checks. When the seedlings have made sufficient growth an infection of crown and stem rust is induced by conventional methods to supplement any natural infections that may have developed.

Natural fall and winter epiphytotics occur rather frequently although late winter and early spring induced infections are mostly depended upon to make the final elimination of susceptible plants. Regardless of the time or epiphytotics, all susceptible plants as soon as detected are pulled immediately and discarded.

This process of elimination is continued until the oats start to ripen. A big advantage of the long and usually rather mild seasons for both plant and rust development is that time usually is available, if feasible to inoculate with additional races of crown rust and also with stem rust and thus make further eliminations of susceptible plants.

<u>Second year</u>: By harvest time of the second year usually only a relatively small number of F_2 hybrid plants remain for further testing. No plants at all may remain from some crosses.

All F_2 plants, however, that show satisfactory resistance or survive the ravages of several rust epiphytotics are harvested and sown in plant or panicle rows in the fall of the second year. If a certain cross or crosses should show unusual promise seed from a few of the most vigorous F_2 plants is sent to Aberdeen Idaho for rapid increase to supply seed for sowing the F_4 population on the developing station in the fall of the second year. As a rule, however, seed from most of the surviving F_2 plants is sown on the home station in 15-foot or shorter rows for a further test of their rust resistance and for making agronomic observations in the F_3 generation. In most cases the F_3 progenies are subjected to induced epiphytotics of the rusts and all progenies failing to continue to show a satisfactory degree of resistance are discarded. In the fall of the third year all surviving and agronomically desirable lines are advanced to yield-test nurseries for the determination of relative productiveness, grain quality, standing ability, and general adaptation.

Provided new hybrids are made available each year, a continuous and machine-like system is thus followed, which if all the potentialities of available breeding stocks are considered, is almost bound to produce a reservoir of new resistant material for testing on the home station and for sharing with stations in adjoining states.

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Seed Certification and the Release of New Varieties of Oats
By W. H. Chapman, Quincy, Florida

A strong seed certification program is a vital and important part of any well balanced crop improvement plan. Certification agencies have been instrumental in making available to the public high quality seed of adapted varieties. However, the release of Floriland in 1952 and Sunland in 1953 has suggested that perhaps the present standards do not allow for the variability in varieties resulting from wide crosses with *Avena byzantina*.

In 1952 reports from the State Seed Laboratory showed a number of kernels in foundation stocks of Floriland oats which did not comform to the predominant kernel type of this variety. A similar situation occurred in 1953 when Sunland was released. According to the standards prevailing at the time, these "off type" kernels were classified as other varieties and immediately presented a problem with certification or registration of subsequent crops. The off type kernels could not be correlated with any variety grown on a field scale on the farm in recent years and instead of mechanical mixture, probably represented segregates or mutants resulting from the wide crosses involving *A. byzantina*. Further investigation showed that similar problems had occurred in many of the other states. In many of these instances the description of the variety was written to include the known off type kernels so it would pass certification standards. This was not acceptable in Florida but was solved by setting up a tolerance for the variable kernels and listing the number per pound on the foundation tag as off type kernels. This classification was in addition to other varieties and other small grains.

I am in no way proposing that less emphasis or a more lax set of requirements be maintained for the production of quality seed. All of us want pure oats and a minimum of mixture of other varieties. Definite standards must be established and adhered to but these standards should allow for the natural mechanics of nature. The varieties were uniform under field conditions and in variety tests but existing standards did not allow for any genetic variability so often encountered in derivatives of crosses with *A. byzantina*.

A small grain breeder should be vitally interested in developing high yielding and disease resistant varieties that will insure a good crop for the farmer. The ever changing disease situation is a continual threat to oat production in the United States and especially Florida. For instance the prevalence of physiological races of crown rust is undergoing the third change in Florida during the past five years. To combat this problem, numerous crosses involving diverse combinations of germ plasm have been made. As a result the problem could become worse rather than better unless an answer is found. All oat breeders are familiar with the difficulty in selecting and re-selecting newly-bred varieties to a satisfactory degree of purity. In the case of oats in Florida this process could easily shorten the economic value of a variety. A uniform variety is a must but it is questionable whether it is necessary to fix a number of characters pertaining to kernel type i.e. no partially developed callus in a variety free of "suckermouth".

After a variety has been developed and the breeder believes it suitable for release, it seems that it is too late to make concessions to allow certification. The wide crosses which are being made will probably increase morphologic instability in our future varieties. Perhaps a closer cooperation between breeders and certification agencies and seed analysts would eleviate many of the difficulties encountered in the distribution of varieties such as Clinton, Floriland, Sunland, and others. This cooperation should help solve problems involved with varieties derived from parental material noted for its variability in plant and seed characters.

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Fluorescence vs. Non-Fluorescence

By A. M. Schlehuber and R. M. Chatters (Stillwater)

Certification of oat varieties has been seriously restricted in Oklahoma in the past few years because of the insistence of State seed analysts that varieties be 100 percent uniform for fluorescence or non-fluorescence of the seeds. The peak of the difficulty was reached in the spring variety Andrew C.I. 4170, presently on Oklahoma's recommended list. The original foundation seed of this variety was obtained from the originating station, Minnesota, in February, 1951.

The original foundation seed and nearly all lots of breeder's, foundation, and certified seed produced in Oklahoma have been found to possess a low percentage of fluorescent seeds (when viewed under a 3600A° ultraviolet lamp). The majority of the seeds of Andrew are classed as non-fluorescent and show a bronze color under ultraviolet.

In order to determine the uniformity or variability of this character the Oklahoma Station made some detailed analyses of progenies obtained from both fluorescent and non-fluorescent separates from Andrew oats. All seeds, numbered from top to bottom, from one panicle per plant were examined individually in comparison with two "controls" - one fluorescent the other non-fluorescent.

In making the examination of the seeds it was found necessary to place them into about five classes in order to express all degrees of fluorescence through non-fluorescence. These five classes were: (1) fluorescent (F), (2) non-fluorescent (NF), (3) intermediate, (4) intermediate to fluorescent, and (5) fluorescent to intermediate. Briefly the results were as follows:

(1) Progenies from non-fluorescent seeds.

Number of progenies examined	47
Number of progenies with all seeds non-fluorescent	13
Number of progenies with both non-fluorescent and fluorescent seeds in same panicle	6
Number of progenies all fluorescent	1
Number of progenies having both non-fluorescent and intermediate seeds (but not fluorescent)	25
Number of progenies having only intermediate seeds	2

Summarizing for total number of seeds the results were as follows:

Total number of seeds examined	1723
Total number of seeds non-fluorescent	1033 or 60%
Total number of seeds fluorescent	92 or 5.3%
Total number of seeds of all classes of intermediates	598 or 34.7%

(2) Progenies from fluorescent seeds.

Number of progenies examined	41
Number of progenies fluorescent	40
Number of progenies with non-fluorescent and intermediate seeds	1

Summarizing for total seeds:

Total number of seeds examined	958
Total number of seeds fluorescent	930
Total number of seeds non-fluorescent	17 or 1.8%
Total number of seeds intermediate	11 or 1.1%

Bond, one of the parents of Andrew oats, is about 50-50 for fluorescence and non-fluorescence. This fact, along with the results reported above would make it appear that this character is so variable within one plant and from one generation to another that its usefulness in making exact determinations of oat varieties is extremely questionable. The study of this subject is being continued.

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III. CONTRIBUTIONS FROM CANADA

Cereal Division
Central Experimental Farm
Ottawa, Canada

By R. A. Derick

The 1953 season was, in general, favorable to oat production in Eastern Canada. Adverse weather conditions, diseases and insects caused considerable damage in certain areas but on the whole, the yields were average and, in Ontario, better than average.

Rust was damaging in local areas. Army and wire worms seriously reduced yields in some areas of Nova Scotia, while culm rot or black stem caused by Septoria avenae undoubtedly lowered yields in many areas, particularly in the Lower St. Lawrence Valley and in parts of the Maritime Provinces.

Two new varieties were introduced in Eastern Canada in 1953. Shefford, a cross between Roxton and Mabel, was released from Macdonald College. This is an early maturing variety of the Cartier type but having some of the desirable characters of Roxton. Scotian was released from the Nappan, N.S., Experimental Farm, particularly for conditions in that province. Scotian is a sister of Beaver (Erban x Vanguard), has about the same maturity and disease resistance, but is thinner in the hull and yields better in Nova Scotia and parts of New Brunswick.

The Laboratory of Plant Pathology, Winnipeg, Manitoba, reporting on prevailing races of rust in Eastern Canada in 1953, states that stem rust race 7 continued to be on the increase in this area and was the predominating race this year. Among the most prevalent races of crown rust were 201, 202 and 203. This was particularly true in Ontario and Quebec.

Oat breeding work in the Cereal Division, Central Experimental Farm, Ottawa, continues to emphasize rust and smut resistance combined with greater lodging resistance. The effort to introduce new germ plasm from wild oat species, having lower chromosome numbers, by hybridization and chromosome doubling is becoming an increasingly important project. The results obtained have been very encouraging. Hybrids have been obtained between diploid species ($n=7$) and tetraploid species ($n=14$); also between tetraploids and hexaploid species ($n=21$). Although the F_1 hybrids are very highly self sterile, seed has been obtained by colchicine treatment and by backcrossing. More extensive work on this program is being conducted by F. J. Zillinsky in connection with his Ph.D. thesis at Iowa State College.

Encouraging results have been obtained in the search for varieties resistant to Septoria avenae. Field tests at several locations in

Eastern Canada have demonstrated that under natural disease infection, varieties are available that show a high degree of resistance. Crosses are being made in an attempt to combine this resistance with adapted commercially grown varieties.

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Laboratory of Cereal Breeding, Winnipeg
By J. N. Welsh

Stem rust and crown rust infections were unusually heavy in Manitoba in 1953, with the two most prevalent races being 7 of stem rust and 202(45) of crown rust. The reactions of a number of varieties to these two diseases at Winnipeg are given below:

Varieties	% Crown Rust	% Stem Rust
Ajax	60	40
Abegweit	80	30
Branch	20	40
Cherokee	70	85
Clintafe	Tr.	85
Clinton	75	60
Exeter	75	30
Garry	20	0
La Salle	75	65
Mo-0-205	20	50
Rodney	15	0
Simcoe	75	40

It is of interest to note that Branch, Garry, Mo-0-206, and Rodney which are resistant to Victoria blight in spite of their Victoria parentage were resistant to 15 of the 20 races of crown rust that were identified in Canada in 1952. The crown rust reactions above indicate that under field conditions the resistance to crown rust of these varieties is much superior to those possessing the Bond resistance. As these varieties are also resistant to race 7 of stem rust their combined resistance to the prevalent races of both rusts affords greater protection against these two diseases than other varieties grown commercially.

Race 7A is still of minor importance as only two collections of it were identified in 1952. However, inheritance studies carried on at Winnipeg with this race revealed some interesting information. These studies were made on F_3 seedling lines, derived from crosses involving the Hajira source of resistance, to determine their reaction to the several stem rust races, including race 7A. The results indicated that the resistance to these races is conditioned by three genes. Gene A (present in varieties such as Ajax, Richland and Green Russian) conditions resistance to races 1, 2, 3, 5, 7, 7A, and 12. A second gene B (present in varieties such as Canuck and Hajira x Banner, R.L. 524) conditions resistance to races 1, 2, 3, 5, 7, and 12, but is not effective against race 7A. A third gene C, also present in Canuck and R.L. 524, conditions resistance to races 4, 6, 8, 10, 11, and 13.

In brief, varieties with the Ajax, Richland, and Green Russian resistance contain gene A, varieties with the Canuck resistance contain genes B and C, and varieties with the Garry resistance contain all three genes, because they are resistant to all races. A paper on this subject has been prepared for publication.

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Laboratory of Plant Pathology, Winnipeg, Canada
By G. J. Green, B. Peturson, T. Johnson

In Manitoba a heavy infection of stem rust developed on wild oats and in late fields of oat varieties susceptible to race 7. Infection was light on oat varieties resistant to race 7. Crown rust also was prevalent on wild and cultivated oats throughout the province.

Thirteen races of oat stem rust were isolated from rust collections obtained from all regions of Canada. The races identified were: 1, 2, 3, 4, 5, 6, 7, 7A, 8, 10, 11, 12, and 13. Race 7 was the predominant race with race 8 next in order of prevalence. Race 7A, which was described in the 1952 National Oat Newsletter, was again isolated. This biotype is distinguished from other race 7 cultures by its ability to attack the variety Rodney, which is resistant to all other races to which it has been tested. In 1952 race 7A was collected only in Manitoba, but in 1953 one isolate was obtained from Saskatchewan and another from Quebec. Apparently this race is widely distributed, although it is of rare occurrence at present.

Crown rust races identified in 1953 were: 201, 202, 203, 209, 211, 212, 228, 229, 230, 231, 232, 234, 235, 236, 237, 238, 239, and 240. Races 201, 202 and 203, which are capable of attacking varieties possessing the Bond type of resistance, predominated in Western Canada, Ontario, and Quebec. Race 239 predominated in the Maritime Provinces. The varieties Landhafer, Santa Fe, Trispernia and Victoria were resistant to all of the isolates.

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IV. CONTRIBUTIONS FROM U.S.D.A. AND STATES

ARIZONA

Dr. Arden D. Day, who recently completed a doctoral thesis at Michigan State College, has been named Assistant Professor of Agronomy at the University of Arizona and will be in charge of the work on small grains.--(Ed.)

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ARKANSAS

By H. R. Rosen (Fayetteville)

Although the state average oat yield of 35.0 bushels per acre in 1953, is the highest on record for the state, and exceeded the national average by about 5.0 bushels, it was still far below the yields obtained in the experimental test plots of winter oats at the University Farm, Fayetteville. The 10 highest yielding varieties in these plots, most of them standard varieties in common use, averaged at the rate of 106.3 bushels per acre. The fertilizer used consisted of 400 pounds of 5-10-5 at seeding and 100 pounds of ammonium nitrate per acre in early March.

What is the reason for this marked discrepancy in yield between the state average and that in the test plots? It is surely not due to superiority in productivity of soil, for the soil in the test plots represents a hilly or upland type of moderate productivity compared with the superior soils in the delta and the grand prairie where the largest acreage of oats is grown. The discrepancy appears to be due mainly to the following: first, and probably foremost, the inadequate or no use of fertilizer; second, the use of unadapted varieties; and third, poor seed bed preparation, poor seeding and lack of seed treatment.

While Arkansas, among other states, has made considerable progress in the use of fertilizer, one of the commonest symptoms found in the annual surveys I have made in all the important oat-growing counties, the survey extending back to 1936, consists of typical nitrogen starvation, at times aggravated by phosphate and potash deficiency symptoms. Yellowing and reddening of foliage (sometimes due to various parasitic diseases and to insects), poor tillering and stunting of plants are to be observed over a large part of the state. Even in the delta soils, from Chicot County in the south to Mississippi County in the north, it was far more common in May, 1953, to see fields of Victorgrain 48-93, a variety well adapted to that region, looking sickly yellowish-green and averaging 30 to 36 inches or less in height when the plants were in the early milk stage, than to see deep-green plants of the same variety averaging 42 to 48 inches. The degree of stooling averaged much below that of healthy Victorgrain plants.

The term "unadapted varieties", one of the other important factors involved in the relatively low state average yield, is used in a wide sense to include varieties such as spring oats- still being used, mostly in the two northern tiers of counties, and those with weak straw. Because of driving rains and strong winds that were abundant in the rice-growing area at the time of ripening and harvesting, such varieties as Ferguson 922 and all other Red Rustproofs lodged badly. Such lodging often resulted in considerable loss in yield. At the Rice Branch Experiment Station, Stuttgart, out of 20 varieties in the test plots, there were only two that showed little lodging on May 13. These were Arkwin and Delair and even these lodged a few days later. Varieties that were 100 percent lodged included Atlantic, Arlington, De Sota, Mustang, Nortex,0112, Fulgrain, Ferguson 922, and Lee 5. It should be noted, however, that a 75-acre increase block of Arkwin, close to these test plots, showed slight lodging although many of the plants stood 5 feet high. It yielded about 75 bushels per acre combine run. (Cooperative tests throughout the South indicate that Arkwin has one of the best straws of any variety available at present.)

The third factor involved in the relatively low state average yield, poor seed bed preparation and poor seeding, is largely confined to growers in the hilly parts of the state and to the coastal plains. Many of these have inadequate equipment to prepare a good seed bed, have no grain drills, and simply "scratch" the soil surface or just "hog-in" the seed. Lack of seed treatment accounted for a loss of at least 5 to 10 percent of the crop, smut alone in some fields causing a loss up to 35 percent.

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Dr. T. H. Johnston, recent Ph.D. from Iowa State , has taken over the rice breeding and testing work at Stuttgart and will also do a certain amount of work with oats. Dr. Adair, formerly here at the Rice Branch Experiment Station, is now in charge of rice investigations for the Section of Cereal Crops and Diseases of the U.S.D.A. (Beltsville).

Dr. Johnston reports that a prolonged wet spring and subsequent severe lodging prevented the harvesting of the 1953 oat tests at Stuttgart.--(Ed.)

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CALIFORNIA

By C. A. Suneson and C. W. Schaller (Davis)

"BACKGROUND OF OAT PRODUCTION AND BREEDING IN CALIFORNIA"

Compared with oats there is approximately three times as much wheat and nine times as much barley grown in California. Oats traditionally produces fewer pounds of grain per acre, and commonly sell for less per pound.

Comparative yields of three important varieties at Davis are:

	1934-42	1943-53
Palestine	88	109
Kanota	78	93
Ventura	--	93

The yield relationships here shown are typical of those obtained in extensive out-state testing.

The importance of varietal adaptation to average yields is exemplified by the above results. Although the variety Ventura has given complete protection from crown and stem rust, its average yield has not been higher than that of Kanota despite "epidemic" stem rust levels during five of the last 11 years. Palestine, which is extremely susceptible to stem rust (and most other diseases), has excelled in average yield under the same conditions.

The distinctive adaptation factors of Palestine have been combined with stem rust resistance in a selection from Victoria-Richland x Palestine^5 which may be ready for increase in 1955. It may not be useful outside the arid winter oat area, but it should make oats much more competitive with other grains in California.

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FLORIDA

By W. H. Chapman (Quincy, Florida), R. W. Earhart and A. T. Wallace (Gainesville, Florida)

OAT BREEDING IN FLORIDA

Two new oat varieties were released to the Florida farmers for growing in the 1953-54 season. Sunland, C.I. 6600, was selected from the cross Fulghum 708 x Landhafer and possesses the Landhafer - type of crown rust resistance combined with high yield and forage production, and good quality grain. This variety was developed for the general oat producing areas of Florida. Seminole, C.I. 5924, selected from the cross Appler x (Clinton^2 x Santa Fe), combines the Santa Fe - type of crown rust resistance with earliness, short, stiff straw, excellent grain yields, and early forage production. This variety is probably better adapted to the more southern oat producing areas of the State. Dr. D. D. Morey, formerly with the Florida Experiment Station, selected these two varieties.

The nurseries contain a large number of lines combining crown and stem rust resistance. Numerous crosses were made in 1953 combining several sources of crown rust resistance into a single combination. The breeding nursery at Quincy and the disease nursery at Gainesville is being tested for resistance to prevalent races of crown rust as well as races 7, 7A, and 8 of stem rust. New sources of crown rust resistance as well as additional sources of stem rust resistance will be used extensively in the crossing program this spring.

The oat breeding program in Florida is entering a third phase. The first phase was to induce crown rust and culm rot resistance into the adapted varieties. To date four varieties having three different combinations of crown rust resistance have been released - Southland 1950, Floriland 1952, Sunland and Seminole in 1953. The second phase was to combine stem rust resistance with the crown rust and culm rot resistance. Although to date no variety having stem rust resistance has been released, several advance selections with different combinations of crown rust resistance as well as stem rust resistance are being tested in anticipation of releasing one or more of them.

Along with a continuation of crosses of high yielding, disease-resistant lines a third phase of the program is being intensified. This third phase has the objective of developing varieties that produce more early forage. The reason for this objective is the 80% of the oats in Florida are grown for grazing only. With this third objective in mind a recurrent selection breeding program is being initiated. We will appreciate receiving seed from any selection that produces high yields of forage and suggestions for evaluating large numbers of segregating populations for their forage producing ability.

The disease testing program outlined in last year's Newsletter is being continued. In addition, stem rust 7A is being included. To date 1,498 varieties and selections have been inoculated with this race of the fungus. The varieties listed below failed to become infected. In about 40 other selections some resistance was present among the segregates. There is always a chance that some "escapes" occurred. Further testing will be required to "prove the point".

Table 1. Oat Varieties Indicating Some Resistance to Stem Rust Race 7A.

C.I. or P.I.	Name or Number	Reaction
197788	2206	R-I
197791	2250	R-S
197794	2296	R-I
2565	Cartier	R-S
6718	Lemont Cross	R-S
6902	Stanton Strain	R-I
708	Fulghum	R-S

This year, in addition to this "regular" testing program, we inoculated 606 panicle families of C.I. 6700 and 773 of C.I. 6701 from the irradiation program of the Brookhaven Laboratory with stem rust race 7A. At present we have not succeeded in infecting about 30 plants of C.I. 6700 and about 90 plants of C.I. 6701. However, repeated inoculations are still being made.

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By A. R. Brown (Athens)

1953 was another good oat year in northeast Georgia. Oat yields were high but Mother Nature did not cooperate by providing clear, dry weather after the oats had ripened. Rainy weather at harvest time caused the oat plants to lodge, resulting in a lot of slightly and materially weathered oat grain.

Yields in the Uniform Fall Sown Oat Nursery ranged from 66 bushels per acre for C.I. 6603 to 103 bushels for Alamo, Delair and Ark. Sel. of (Hajira-Joanette) x (Fulghum-Victoria) or C.I. 5873. De Soto and Mustang yielded 102 and 100 bushels per acre, respectively. In other words, the oats from the western part of the cotton belt were the top yielders. It will also be of interest to know that the month of May was hot and dry in north Georgia, conditions to which the Texas and Arkansas oats are adapted better than are the eastern varieties.

Winter survival for 1953-54 Fall Sown Oat Nursery was high. The only varieties showing appreciable winter killing were Southland, Floriland, Seminole and Sunland. These had average survival of 80, 87, 84, and 82 per cent, respectively, over 4 replications.

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By U. R. Gore, H. B. Harris, E. S. Luttrell (Experiment)

The average acre yield of oats in Georgia reached a record high of 32 bushels in 1953. Perhaps 50 percent of the Georgia oat acreage is grazed or hogged off. A large portion of the oat acreage harvested for grain is grazed for one or two months without cutting seed yields appreciably. Often the value of the winter pasturage obtained is as valuable as the grain crop. Extra nitrogen top-dressing up to 100 pounds per acre, is applied on the acreage pastured. Oats for winter pasture need to be sown early on fallowed land.

Testing of oats to soil-borne mosaic was continued in 1953. Approximately 4000 lines were screened in addition to 360 lines in the oat mosaic nursery. This nursery is open to any oat breeders who wish to have advanced lines checked for mosaic resistance.

New races of crown rust which attack all oat varieties now grown in Georgia, were collected this past season, mainly in the southern part of the state. Dr. Simonds identified these collections as races 202 and 213. All breeding lines of oats are screened for resistance to these newer races.

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By S. A. Parham and Darrell D. Morey (Tifton)

Replicated tests (1/100 acre) of the main commercial varieties of oats and wheat are grown each year at Tifton. Grain yields are recorded from these tests and they serve as valuable demonstrations for visiting farmers and students. For the past several years clipping tests of oats, wheat, rye, ryegrass and rescue grass varieties have been conducted by the Forage Crops research group at Tifton. They also conduct grazing trials with oats and rye where the yields are measured in pounds of beef per acre.

In addition to these tests and the Uniform U.S.D.A. wheat and oats nurseries, the breeding work on small grains is being expanded in the Coastal Plain area of Georgia.

Emphasis is being given to the development of disease resistant lines of both oats and rye. Attention will be given to types best suited to the production of winter forage for the Coastal Plain area. Plans have been made to cooperate and coordinate the work with the programs already underway at the North Florida Experiment Station and the Georgia Experiment Station, Experiment, Georgia.

This fall the most interesting observations have been on aphids. Grain aphids (Toxoptera graminum) have especially preferred oats over rye or wheat and damaged ryegrass very little. Oats under poor nutrient conditions have been severely damaged while those under fertile conditions were damaged much less by the feeding of aphids.

In tests at Thomasville, Georgia, where aphids actually killed some plots of oats, varietal tolerance could be noted. C.I. Nos. 6604, 6740, 6914, 6922 and Camellia showed less damage in all replications than the majority of oat varieties. Severest aphid damage was recorded on C.I. Nos. 6666, 6744, 6755 and most Red Rustproof types. Tolerance to aphids appears to be related to general vigor of a variety at the time these insects attack, but much more needs to be known about this problem.

Winterkilling has not been a problem in South Georgia this season. Oat fields have been relatively free of diseases up to mid-February although many are in need of additional nitrogen for best growth.

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IDAHO

By Harland Stevens (Aberdeen)

The yields produced by oats grown on irrigated land in 1953 were above average. Yields on dryland, however, were below normal. No diseases of consequence were observed or reported from any section of the state.

Frank C. Petr, formerly (until November 1, 1953) in charge of the oat breeding and testing work for the State of Montana, transferred to the USDA and is now located at Aberdeen. Frank's time and energy will be equally divided between research with oats and barley.

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INDIANA

By R. M. Caldwell, F. L. Patterson, J. F. Schafer, L. E. Compton, J. E. Newman and R. R. Mulvey

THE SEASON AND THE MATERIAL

The early season environmental conditions in 1953 were excellent for oat production, but followed by a period of high temperature beginning just after mid-June and continuing the remainder of the month. This hot weather prematurely hastened ripening and prevented the full development of the usual varietal characteristics.

This sequence of weather generally favored earlier maturing oats and was particularly favorable to selections from the parentage, Nemaha x Clinton-Boone-Cartier. C.I. 6642 and related selections of this hybrid were the top performers in Indiana in 1953. In six experimental plot tests throughout the state, C.I. 6642 was an outstanding performer in all six tests and averaged 61.4 bushels per acre, 34.3 pounds test weight, and 17% lodged as compared to a six-test average of the means of all entries in each test of 57.3 bushels, 32.2 pounds test weight, and 27% lodged.

Varietal Recommendations

The Purdue Agricultural Experiment Station is continuing the policy of making annual recommendations of small grain varieties (Experiment Station Circular 400). Clinton 59 and Benton are again recommended for northern Indiana and Mo.0-205 for spring sowing in southern Indiana. Dubois and Forkedeer are recommended for fall sowing in southern Indiana. Clintland and Clintafe are being added to the recommendations for northern Indiana but will not be generally available for sowing until the 1955 season.

All recommended varieties are eligible for seed certification. In 1953 12,239 acres of certified seed oats were grown of which 88.8% was Clinton 59.

Notes on New Varieties

Dubois C.I. 6572 which was released to certified seed producers for fall sowing in 1952 is now in its first season of general production. The year 1952-53 was particularly favorable for winter oat production, and Dubois made an auspicious start. In plot tests in southern Indiana it yielded 95 bushels per acre with a 38 pound test weight. Other important qualities of Dubois are its stiff straw and smut resistance.

Clintland C.I. 6701 has been released to certified seed producers for spring sowing in 1954 and is also being multiplied in Iowa, Wisconsin, and Illinois. This variety combines resistance to the currently known North American races of crown rust with the qualities of the Clinton variety. The two varieties have been rated the same for straw stiffness, have headed on the same date, are within an inch in height, and have been indistinguishable in the field in Indiana in the absence of crown rust.

Clintafe C.I. 5869, developed by H. C. Murphy and R. E. Atkins of the Iowa Agricultural Experiment Station and the U. S. Department of Agriculture, has also been released to Indiana certified seed producers for spring sowing in 1954. It is expected that the utilization of these two varieties with different crown rust resistance will give more dependable protection to the Indiana oat crop.

Disease Notes

The most severe disease affecting oats in Indiana in 1953 was "red leaf" which occurred widely in the state. Red leaf patches developed conspicuously during the first week of June, about a week before heading of the common varieties. Damage this year was greatest in later maturing varieties.

Crown rust was found generally distributed but did not develop sufficient severity to cause appreciable damage.

Stem rust of oats was also prevalent and developed the greatest severity observed here during the period 1930-1953. However, the severity was not great enough to cause appreciable damage in the state.

Powdery mildew was observed on winter oats at Lafayette, although it was not severe (Pl. Dis. Rptr. 37: 569). This is believed to be the first report of powdery mildew on oats in the field in Indiana. No mildew was observed on spring oats.

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By Departments of Botany and Plant Pathology and Agronomy (sent in by K. E. Beeson)

Clintland Oats

Clintland, a new spring oat variety developed by the Purdue University Agricultural Experiment Station and the U. S. Department of Agriculture, has been released for spring sowing in 1954. The new variety was bred to combine resistance to the new races of crown rust with the desirable qualities of the Clinton variety. Crown rust has long been the number one disease of oats in Indiana, and resistance to it is needed to meet the threat of potential loss from future crown rust epidemics. The breeders are Ralph M. Caldwell, Leroy E. Compton, John F. Schafer and Fred L. Patterson. The new variety was developed by crossing Clinton 59 with Landhafer and backcrossing selected crown rust resistant progeny to Clinton 59 three more times.

Clintland is similar to Clinton 59 in all of the characters observed except its crown rust resistance. The two varieties have been given identical ratings for stiffness of straw, have headed on the same date in both 1952 and 1953, are within an inch in height, and have been indistinguishable in the field of Indiana in the absence of crown rust. They are both resistant to race 8 of stem rust and moderately susceptible to race 7. Both varieties are resistant to Indiana collections of smut and to Victoria blight. This close similarity is expected from the method of breeding used to produce Clintland.

In two tests in Indiana in 1952 and seven in 1953, Clintland outyielded Clinton 59 in all tests except two of those of 1953. The overall average superiority was 9.3 percent in all nine tests. A much greater advantage for Clintland may be expected in years of severe crown rust epidemics.

The Clintland variety should be of the greatest value in areas where Clinton and its selections proved adapted and particularly where their superior stiff straw has been needed. Clintland is recommended for Indiana north of U. S. Highway 40 and is considered acceptable for southern Indiana.

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Mr. Beeson writes further to mention "-- the volume of certification of the different oat varieties of 1953 which is available through the office of John Sanders, Extension Agronomist, U.S.D.A., who compiled the annual summary."--(Ed.)

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IOWA

By K. J. Frey (Ames)

Iowa had an especially poor oat year in 1953. The oat crop got off to a good start, with almost ideal growing conditions until about June 1. At this time, infection of both crown and stem rust of oats was noted. The crown rust infection was not particularly unusual, but the stem rust appeared especially early. Overall the estimated yield reduction from both rusts was approximately 40%; 30% from crown rust and 10% from stem rust. This was by far the worst stem rust year since 1926. From the varietal reaction it seems that most of the stem rust which was present was race 7.

The Iowa Experiment Station participated in the increase and release of Clintland variety of oats. Approximately 7,000 bushels of seed have been distributed to growers of certified seed for the 1954 plantings. Clintland continued to show excellent crown rust resistance in 1953. However, it did succumb to the later epidemic of stem rust. Clintland variety in all aspects except crown rust resistance seems to be identical to Clinton.

In the nine oat yield trials conducted in Iowa in 1953, the outstanding varieties were: Andrew, Sauk, Mo. 0-205, Ajax, Branch, and Clarion. It is rather interesting that each of these strains possess some crown rust resistance or tolerance and also has resistance to race 7 of stem rust. In one experiment located at Marcus, Iowa, crown rust was not very prevalent; however, there was a severe epidemic of stem rust. The varieties which were resistant to race 7 of stem rust, yielded approximately 80 bushels per acre, while those which were susceptible to race 7 of stem rust yielded only 60. In this test, one of high yielding varieties was Richland, which of course carries resistance to race 7 of stem rust. Even though Mo. 0-205 is classed as an early to mid-season variety it did well in all parts of Iowa. It did not show excessive lodging last year, at least by comparison with varieties which were susceptible to crown and stem rust.

A technique has been utilized at the Iowa station by which midseason oat varieties can be grown to maturity in the greenhouse, in a period of 65 and 75 days. This allows the plant breeder to grow four crops in one year. This is especially helpful in a backcrossing program. The technique included, growing the plants under continuous flourescence light (40 watts) at a temperature of 65° to 70° F. Abundant fertilizer was supplied to the soil at regular two to three week intervals. For best results, used a high nitrogen fertilizer. Plants of Clinton variety will head about forty-five days after planting. The seed which develops, either selfed or crossed, harvested about twenty-five days later making approximately 70 days from the time of planting until harvest. By using a cold induction period to break the after ripening effect the greenhouse grown seeds will sprout and grow within a week or ten days after harvest. The cold treatment consists of placing the seed on moist blotters and holding at 40° F. for five to seven days, after which the seed is germinated at 60° F. When the rootlets are one-quarter inch long (2 to 5 days) the seedlings are transplanted in soil. In two or three days the sprouts will show above the surface. Approximately seventy-five seeds have been germinated with this method this winter, with only two seeds failing to germinate. The young seedlings are then transferred to a light chamber where they are also kept under continuous light and the cycle is repeated. This results in the possibility of growing three generations in the greenhouse during the winter and one in the field during the summer. The first greenhouse generation must be planted shortly after field harvests; usually sometime during August.

The number of seeds produced on a plant with this continuous light treatment is small. Only one head is produced per plant and the number of kernels per plant is usually less than twenty. However, if after the first head on a plant has been used for crossing purposes the plant be transferred to a cooler room and given short photoperiod a number of tillers will be produced. From these a large number of F_2 seeds can be harvested. This accelerated growth technique is useful only in genetic studies where it is imperative to get a rapid turnover in generations or in a backcrossing program.

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By S. C. Wiggans (Ames)

Photoperiods ranging from 9 to 24 hours, in which the supplemental light was furnished by means of fluorescent lights, were found to markedly affect the tillering capacity of five oat varieties. All varieties tillered profusely in 9 and 12 hour photoperiods, but did not head out, even after 90 days. Plants grown under photoperiods of 15 hours or more had fewer visible tillers but heading date was normal. Viable seed of mid-season varieties was produced in 65 days when plants were grown in a 24-hour photoperiod. The total number of tiller buds per variety, under all photoperiods, was 5.4, 4.5, 4.5, 4.5, and 5.1 respectively, for Bond, Clintland, Mo. 0-205, Simcoe, and Victorgrain.

Mo. 0-205 and Clintland growing in sand cultures containing adequate N_2, P, and K produced a maximum of two tillers per plant. When these varieties were grown in cultures deficient in N_2, only one weak tiller per plant was produced. The addition of N_2, to four week old N_2 deficient cultures, caused the production of from three to four visible tillers per plant.

Long time studies in the breeding nursery at Ames indicate that oats planted over a period of eight weeks in April and May mature during about a 10-day period in July. The length of time from planting to maturity was found to be influenced primarily by temperature with later planted oats requiring fewer days from planting time to maturity than early planted oats. The accumulation of degrees or "heat units" of daily mean temperatures over 40° F. required to mature a single oat variety is approximately the same each year. Early maturing varieties, such as Tama and Mindo, required fewer "heat units" than later maturing varieties, such as Colo and Shelby. With very late planted oats (last two weeks in May) there is a decrease in the number of "heat units" needed to reach maturity which is accompanied by a marked decrease in yield.

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By J. A. Browning (Ames)

A Source of Cyclone Spore Separators

Several inquiries have been received at Ames concerning the availability of the cyclone spore separators developed at Camp Detrick, and described by Tervet and Cassell (Phytopathology 41:286-290, 1951).

The instrument shop at Iowa State College has made spore separators patterned after those made in Frederick, Maryland, for workers at Ames. They have agreed to make these same instruments for other institutions. The cost is $6.75 for one separator, or $3.35 each in lots of 12 or more. Equal labor is involved in making large separators (to which 18 mm. test tubes attach) and small separators (which take a No. 00 Gelatin capsule), and their cost is the same.

It is suggested that persons interested in these place their orders soon. The instrument shop will then hold these orders until requests for enough separators have accumulated to make the lower cost possible. Those placing orders late may have to pay a higher price.

Official requisitions indicating the number desired of each size should be sent directly to Mr. I. A. Coleman, Instrument Shop, 7 Physics Building, Iowa State College, Ames, Iowa. Inquiries, but NOT REQUISITIONS, may be directed to J. Artie Browning, Botany Hall, Iowa State College, Ames, Iowa.

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By H. C. Murphy and R. E. Atkins (Iowa-USDA)

Seed Fluorescence in Oats

The hulls of some oat varieties fluoresce when placed under an ultraviolet light. The fluorescence or non-fluorescence of oat varieties may be used in conjunction with other techniques for varietal identification and for detecting mixtures in the seed purification and certification samples. This characteristic is heritable, being determined by either of two factor pairs.

A list giving the classification of 141 oat varieties for fluorescence or non-fluorescence is available at the Iowa Station.

Influence of Environment on Reaction and Inheritance of Resistance to Specific Races of Stem and Crown Rust

In an M.S. thesis by C. N. Brown it was found that: (1) Sac x Hajira-Joanette (C.I. No. 5870) was resistant to races 6 and 8 of stem rust at low and moderate temperatures, and resistant to race 7 at all temperatures, (2) Clinton x Ukraine (C.I. No. 6537) was resistant to races 6 and 7 at low and moderate temperature, and to race 8 at all temperatures. When tested with races 7 and 8 at temperatures of 56°, 70°, and 80° F. Richland, Andrew, Hawkeye and Sauk were resistant to race 7 and susceptible to race 8 at all temperatures; White Tartar, Clinton, Bondvic, Clintland, Clintafe, $Clinton^2$ x Ark. 674 (C.I. Nos. 6594 and 6750) and Nemaha x (Clinton x Boone Cartier) (C.I. No. 6751) were resistant to race 8 and susceptible to race 7 at all temperatures; Canuck and Alamo were resistant to races 7 and 8 at 56° and 70° F., but susceptible to both races at 80° F.; New Garry and Sac x Hajira-Joanette (C.I. No. 5870) were resistant to race 7 at all temperatures but resistant to race 8 only at 56° and 70° F.; Clinton x Ukraine (C.I. Nos. 6573 and 5871) were resistant to races 7 and 8 at 56° and 70° F., but only to race 8 at 80° F.; and Ukraine (C.I. No. 3259) was susceptible to both races 7 and 8 at all temperatures.

Rust readings from F_2 plants in various crosses indicated that (1) Clinton x Ark. 674 selections possessed the White Tartar gene for stem rust resistance, (2) the Clinton x Ukraine selections possessed the Canuck and White Tartar factors, and (3) Sac x Hajira-Joanette (C.I. No. 5870) possessed the Canuck and Richland factors.

Inheritance of Resistance to Two Races of Crown Rust of Oats

R. E. Finkner proposed in a Ph.D. thesis the following symbols for the genes determining reaction to crown rust races 57 and 109 in several resistant varieties: Klein 69 B (KK), Trispernia (M_2M_2, V_2V_2), Victoria (VV), Santa Fe (M_1M_1, U_1U_1), Ukraine (MM), Landhafer (LL), Clinton (AA), and Bondvic (M_2M_2, V_1V_1). All genes except (MM) and (AA) gave resistance to both races. The gene (MM) in Ukraine conditioned immunity to race 57 and susceptibility to race 109, while the gene (AA) in Clinton gave resista nce to race 109 and had no apparent effect on race 57. It will be noted that two allelomorphic series, one with four genes (M series) and one with three genes (V series) were found.

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By M. D. Simons (USDA-Ames)

The most interesting thing to come out of the crown rust race identification work this season was the discovery of a North American race of crown rust that attacks many of the varieties that are currently being utilized as sources of resistance. This race vigorously parasitizes both

Landhafer and Santa Fe in the seedling stage under greenhouse conditions. Although it is well known that these varieties may show a slight or even moderate degree of susceptibility as older plants under field conditions, this is the first time a North American race capable of attacking them as seedlings has been observed. Limited observations of this race on adult plants of these two varieties in the greenhouse make it appear likely that adult plants in the field will be completely susceptible.

The varieties Trispernia and Bondvic, which have been resistant to all collections of crown rust tested during the past few years, are also susceptible to the new race. Of the remaining differential varieties, Anthony, Appler, Bond and Ukraine are susceptible, while Victoria and Saia are resistant. This race does not correspond to any of the "Landhafer or Santa Fe races" that have been reported from South America or from Israel, and will be designated as number 276.

A summary of the results of the crown rust race survey for 1953 will be published in the Plant Disease Reporter as soon as all the data are available.

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KANSAS

<u>By E. D. Hansing, Kansas State College (Manhattan)</u>

Physiologic Races of Oat Smut in Kansas[1]

(presented at North Central States Oat Conference
Lafayette, Indiana, January 9, 1954)

Physiologic races of the oat smut fungi are highly important in the development of resistant varieties. Many varieties of oats which have been approved and distributed during the last thirty years as resistant to several races of smut, have later been found to be moderately to highly susceptible to other races. A new variety resistant to all of the races of smut has a much better chance to remain resistant when grown commercially.

Since Reed (1924) first described physiologic races of *Ustilago avenae* and *U. kolleri* several investigators have conducted experiments, each with a different set of differential varieties, and found different races. Extensive tests have been conducted at Kansas State College, Manhattan, Kansas, since 1936 to identify physiologic races and to determine their prevalence and distribution in the state. At first most of the varieties used by Reed (1940) were used as differentials. In 1946, however, it was decided to use the standard set of differential varieties

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[1] Professor Hansing has several tables which will be included when published later in a scientific journal.--(Ed.)

used by Holton and Rodenhiser (1948) who identified fifteen races of U. avenae and seven of U. kolleri. Five additional varieties were used.

From 1936 to 1952, although 157 collections of oat smut were used in these experiments, only 102 were tested sufficiently to determine their identity as to an established or new race. Races which were distinct were propagated and from 1946 to 1948 they were used in extensive experiments in the greenhouse and field. Six distinct races and biotypes of Fulghum loose smut were found. The first of these races was characterized by the susceptibility of Fulghum and Black Diamond and was identified as A-12.

The second race was characterized by the additional susceptibility of Anthony, Victory and Gothland. Fulton was also moderately susceptible to this race and in our publications it has been called the Fulton race. This race was distinct from those described by other investigators and was designated as A-16.

The third race differed from the latter in loss susceptibility of Victory; however, this difference was not sufficient to describe it as a new race, consequently it was designated as A-16A a biotype of A-16. The commercial varieties Fulton and Osage also were resistant to this biotype.

The fourth race differed principally from the other Fulghum races in that Monarch was susceptible. It was a distinct race and was designated as A-17.

The fifth Fulghum race of loose smut was characterized by the susceptibility of Fulghum, Black Diamond and Gothland. It was a distinct race and was designated as A-18.

The sixth race of this group was similar to A-18 in reaction to the standard varieties. It differed in that Joanette was resistant to race A-18 but was susceptible to this race, therefore it was designated as a biotype and called A-18A.

Four non-Fulghum races of loose smut were found in Kansas. Richland was susceptible to these races. Anthony, Black Diamond and Victory were susceptible to the first race and it was classified at A-1.

The additional variety Gothland was susceptible to the second race which was classified as A-5.

The third race was characterized by the additional susceptibility of Monarch and the intermediate reaction of Nicol. It was a distinct race and was designated as A-19.

The fourth of this group of races was characterized principally by the susceptibility of Lelina, Victoria, Boone, Tama, and other varieties with Victoria as one of their parents. In our published data from Kansas this has been called the Victoria race of loose smut.

Two races of Fulghum covered smut have been identified in Kansas. The first of these was characterized principally by the susceptibility of Fulghum, Black Mesdag and Monarch and was identified as K-2.

Black Mesdag and Monarch were resistant to the second race which was distinct from those described by other investigators and was designated as K-8.

Seven commercial varieties recommended in Kansas and four additional varieties have been inoculated individually with these races of _U. avenae_ and _U. kolleri_ to determine their reaction. Kanota was susceptible to the Fulghum races and resistant to the non-Fulghum races. Fulton, Osage and Marion were intermediate in susceptibility to A-16 and resistant to the other races, while Neosho was resistant to all of the races. Clinton, Cherokee and Nemaha were moderately resistant to resistant to all of the races. Columbia varied from resistant to susceptible to the different races. Otoe was susceptible only to A-19 while Tama was susceptible only to A-20.

In regard to the distribution of these races of smut in Kansas, the Fulghum and Victoria races were more common in the southern part of the state. The other races were fairly evenly distributed from north to south.

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By W. L. Fowler and E. G. Heyne, Agronomy; C. O. Johnson, E. D. Hansing, and W. C. Haskett, Plant Pathology; and W. M. Ross, Ft. Hays Branch Station

Kansas oat prospects were reduced sharply when hot, dry weather struck late in May and continued through harvest. The net effect was a hastening of maturity, resulting in reduced yields and test weights compared to what might have been expected earlier in the season. Several farmers chose to cut their crop for hay rather than leave it for harvest. Oats averaged 21.5 bushels per acre on somewhat over a million acres harvested in the state, making a total of nearly 23 million bushels. This was about 5 million bushels over the 1952 production but 6 million bushels short of the 1942-51 average. Oats ranked fourth in value of Kansas grain crops produced in 1953. Kansas recommends Cherokee, Nemaha, 0-205, Clinton, and Kanota, plus Neosho and Osage where blight is not a problem.

0-205 was consistently at or near the top in yield in variety tests over the state. Kanota did well, especially in central Kansas. Clintland and Clintafe were among the poorest in performance. Certain of the Andrew x Landhafer selections in the Uniform Red Oat Nursery appear promising, but at the present time no selections are far enough advanced to be considered for increase or possible release.

Stem rust caused damage to some of the later varieties. The resistance of Andrew, Osage, and 0-205 and the susceptibility of Clinton would indicate that race 7, and related types, predominated. Crown rust was not serious in Kansas in 1953. Victoria blight was not observed in the nursery at Manhattan; there probably are only a few acres of susceptible varieties grown in the eastern half of Kansas. Adequate resistance to Kansas races of smut seems to be present in most material being studied in advanced tests.

The Uniform Red Oat nursery is grown at Manhattan and Hays; the North Central Uniform nursery at Manhattan. Any promising entries in either of these nurseries will be entered in advanced tests for more extensive testing. The Special Winter Oat nursery is planted each fall at Mound Valley and Hutchinson. Kansas does not recommend winter oats, yet a hardy variety might find a place in the southern part of the state.

The breeding program is small and is mostly centered at Manhattan. An attempt is being made to incorporate better crown and stem rust resistance into Neosho and Richland-Fulghum type oats by backcrossing.

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LOUISIANA

By W. H. Stroube (Baton Rouge)

Oat Diseases in Louisiana

The prevalence of the common oat diseases in Louisiana was somewhat atypical in 1953. It has been reported in previous Newsletters that crown rust, *Puccinia coronata*, and Helminthosporium blight, *H. victoriae*, are usually the two most serious and prevalent diseases on oats, but in 1953 stem rust, *Puccinia graminis avenae*, was quite serious at Baton Rouge and prevalent at the St. Joseph Station. At Baton Rouge, there was hardy enough crown rust to make disease ratings.

Helminthosporium blight was widespread in South Louisiana in 1953, in both nursery and field plantings. Some of the Victorgrain selections seemed to be the most severely affected of the currently grown varieties. There was some discussion about removing the "zero" tolerance for this disease, which is required for oat seed certification in Louisiana. It was decided, however, to let the certification regulations remain as they were, due to the rapid spread and destruction that often occurs on susceptible varieties when this disease is severe. The group studying this problem feel that this regulation is necessary to assure protection for the Louisiana oat growers.

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MAINE

By L. H. Taylor (Orono)

The 1953 season was relatively favorable for oats with an average yield of 45 bushels per acre for the state. Stem rust was present in most parts of the state but it developed slowly and did little damage. More Septoria was observed than has been seen in recent years.

The new variety, Clarion, C.I. 5647, was increased in Maine in 1953 for release to our seed growers in 1954. Clarion was tested in eight replicated rod row trials and 15 drill strip trials in farmer's fields in 1953. Its performance in general was quite similar to Clinton 59 which is at present our most widely grown variety. Average yields for all trials were 59.1 and 58.4 bushels per acre for Clarion and Clinton 59 respectively. The two varieties were also very similar in plant height, dates of heading and maturity, and bushel test weight. Clarion is even more stiff-strawed than Clinton 59 but it is also more susceptible to Septoria which was severe enough to cause some stem breakage.

Despite the fact that Clarion was not outstanding in Main trials, there is considerable interest in the variety among our farmers. This is due, in part, to the demand for seed of Clarion that has developed in several states in the Midwest, apparently because Clarion is a variety quite similar to Clinton that is resistant to stem rust race 7. Something over 2000 acres of Clarion will be grown in Maine in 1954 and certified seed from some of this acreage will be available in 1955 for planting in other areas.

Rodney, C.I. 6661, was in Maine trials for the first time in 1953 and was the highest yielding variety in the three tests in which it was included. It has a very attractive plump white grain and had the highest bushel weight of any variety in our trials. According to Canadian reports it has a low hull percentage. Rodney was resistant to the stem rust races present in Maine in 1953. It is 2 or 3 days later than Ajax in heading and maturity and has somewhat less lodging than Ajax in our plots. As one years data on a variety may be misleading, we will be quite interested in Rodney's future performance in Maine and in other states that are interested in this late a variety.

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MASSACHUSETTS

By I. K. Bespalov - Field Seed Research, Eastern States Farmers' Exchange, Inc.

Study of Cold Resistance of Winter Oats

A project for the selection of more cold resistant forms within existing varieties of winter oats is being conducted at the Plant Industry Center, Eastern States Farmers' Exchange, Inc., Feeding Hills, Massachusetts.

With the occurrence of mild winters it is impossible to establish the degree of cold resistance of separate lines within the initial material in field experiments. Three laboratory methods are being used to supplement field testing:

I. Presoaking - deep freeze method of Dr. S. S. Ivanoff, State College, Mississippi. This consists of a preliminary soaking of a large quantity (about a half bushel) of seed and then keeping these soaked seed in a deep freeze for 7 to 10 days at -20° F. The survivors are grown in the greenhouse and/or field for multiplication.

300,000 seeds of seven varieties, DuBois, Forkedeer, Wintok, LeConte, Colo x Wintok, Woodward Selection and Fulwin have been so treated. From the 21 seeds that germinated, 17 plants of the Colo x Wintok C.I. 5118 and Woodward Selection, C.I. 5106, have produced 1,540 normal seed. They were planted in field survival trials last fall.

II. The second method is to place soaked seed outside during January and February and subject these to the variables of temperature and humidity under natural conditions.

Only eight seeds of Forkedeer and six of the Arlington varieties out of 60,000 seeds survived the outside exposure during the winter of 1952-53. The progeny were planted in a variety test in the fall of 1953.

III. To check further on the effectiveness of these laboratory methods, spring oats and winter barley have been included in the soaking - deep freeze treatments. The germination of these entries after being subjected to different temperatures is shown in Tables I and II. The majority of the seed that sprouted did not survive under favorable cultural conditions.

These preliminary data suggest that the seeds are killed by the low temperatures and that prolonged exposure at -20° F. may not be necessary for preliminary screening of varieties for cold resistance.

Differences in the degree of cold resistance within the same variety were greater than differences between the varieties tested.

The survival of winter cereals is dependent upon several factors other than cold resistance. A laboratory method that is concerned with only one factor leaves much to be desired. Such can be a useful tool, however, to supplement field appraisal.

Table I

Reaction of Winter Oat and Winter Barley seed after Treatment in Deepfreeze

Treatment	% Germination of Seed				
	Winter Oat		Winter Barley		
	Lemont Cross	Wintok	Kenbar	Hudson	Wong
C.I. Nos.	6718	3424			
Temperature + 12° F.	91	81	97	98	98
Temperature - 2° F.	36	35	47	22	6
Temperature - 18° F.	0	0	21	3	0
Temperature - 22° F.	0	0	0	0	0

Table II

Reaction of Seed (Winter Oat and Spring Oat) after Treatment in Deepfreeze

Treatment	% Germination of Seed				
	Lee	LeConte	New York Sel.	Clinton x Hairy Culberson	Spring Oat
C.I. Nos.	2042	5107	5364	5368	Clarion
Temperature +32°F.	--	--	--	--	89
Temperature +12°F.	90	81	92	88	72
Temperature + 6°F.	--	--	--	--	23
Temperature + 1°F.	79	37	65	43	--
Temperature - 2°F.	--	--	--	--	0
Temperature - 4°F.	30	13	35	27	0
Temperature -12°F.	6	0	3	0	0
Temperature -18°F.	0	0	0	0	0

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MINNESOTA

By W. M. Myers, F. K. S. Koo, M. B. Moore, and B. J. Roberts (St. Paul)

Studies on the combined resistance of the White Russian type and the Rainbow type in the single lines have been reported in Newsletter Vol. III. In testing F_3 lines of three crosses--Andrew, Clinton, and Gopher x lines with combined resistance /Landhafer x (Mindo x Hajira-Joanette) x Andrew/--to races 7 and 8 of stem rust at 85° F. in the greenhouse, it was found that the White Russian and Rainbow genes were linked in the lines with combined resistance with c.o.v. of less than 1% (calculation based on inadequate data). This result suggests that these two genes were pseudo-allelic and that crossing over between them occurred in the origin of these lines. On the other hand, the possibility remains that these two genes were originally allelic and that unequal crossing over occurred. Further studies are needed to clarify this point.

For breeding purposes, selections will be made from the F_4 and F_5 resistant lines of the above-mentioned crosses grown in the field this year.

The lines with such combined resistance (in addition to the Canadian type of resistance and Landhafer resistance) have been used in crosses with another 16 varieties and selections of high-yielding ability. The F_1s are being grown over winter in California and Mexico. The first backcrosses for certain combinations are being made in the greenhouse this spring.

It may be of some interest that a few lines from crosses--[Landhafer x (Mindo x Hajira-Joanette)] or [Landhafer x (Bond-Rainbow x Hajira-Joanette)] crossed with Andrew or Clinton--appeared rather promising in yield tests last year. These lines and a great number of new selections from the same crosses will make up the majority of entries in our rod-row trials this year. Some of these have 3 types of stem rust resistance.

Our plans for two selections which have yielded consistently more than Andrew and carry resistance to both rusts, may be mentioned here. Landhafer x (Mindo x Hajira-Joanette) II-46-3 is being increased on a very limited scale in Arizona over winter and (Bond-Rainbow x Hajira-Joanette) x Landhafer II-47-25 will be purified for seed color befor a similar limited increase is made next winter. Both selections are in the North Central States Uniform Yield Nursery.

In order to study the possibilities of induction of disease resistance and other favorable agronomic characters in oats by ionizing radiation, three varieties-- Ajax, Clintafe, and Saia--were irradiated at the Brookhaven National Laboratory with X-rays and thermal neutrons. The immediate deleterious effect of radiation found in the R_1s grown at University Farm last year were poor emergence, killing in seedling stage, slow rate of growth, over-all reduction of plant size, reduced tillering, delay in heading and in maturity, and low fertility. The degrees of injuries increased with dosages. Chlorophyll-deficient sectors and somewhat faint mottling on the first leaves were also observed. There were varietal differences in sensitivity to different types of radiation. In our studies, only the material treated with thermal neutron for six hours has yielded enough seed for us to carry out rust tests in the greenhouse. In testing about 240 panicle progenies (R2) of Ajax along with about 160 check pots of the same variety against race 8 of stem rust at high temperature, a few resistant plants have been found in two R2 progenies. Light greens and yellow greens have been most frequently observed among the chlorophyll mutants. More material is being tested to different races in the greenhouse at the present time.

Cytological studies are under way on the interspecific crosses involving 12 species, namely A. strigosa, A. brevis, A. pilosa, A. Wiestii, A. nudibrevis, A. abyssinica, A. barbata, A. fatua, A. sterilis, A. ludoviciana, A. byzantina, and A. sativa. In certain species collections, chromosomal variations and irregularities such as nullisomic, translocation, non-disjunction, etc. were observed.

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MISSISSIPPI

By S. S. Ivanoff (State College)

Results with the Mass-Screening Method for Resistance to Helminthosporium Victoriae Blight

After treating many millions of oat seeds by the mass-screening laboratory method for testing oats for resistance to Victoria blight (Jour. Heredity 42:224-230, 1951) a number of blight-resistant lines were established. Among these, one strain showed considerable combined resistance to Victoria blight and crown rust. This strain was derived from Victorgrain 48-93. Its resistance to Victoria blight seems to be as good as that of the red oats (Delta Red 88, Nortex 107, etc.) used generally for planting in Mississippi. It showed good resistance to crown rust as tested in the greenhouse (old races 45 and 57) and in the field at two places in 1952-53. This crown rust resistance was slightly lower than that of Victorgrain 48-93, but considerably higher than that shown by the red "rustproof" and other commonly grown varieties. This strain of oat resembles very closely Victorgrain 48-93 in most respects, including forage and grain qualities. It also seems earlier than Victorgrain 48-93. Further trials with this new oat are under way.

Root Abnormalities in Oats and Other Small Grains Grown in Nematode-Infested Soil

Abnormal oat specimens were found on the grounds of the Coastal Plains Branch Experiment Station near Newton, Mississippi, adjoining a small planting of Irish potatoes showing severe root-knot injury. The roots of the oat plants showed (1) slight swellings resembling root-knot nematode injury on other plants, (2) stubby terminals with tufts of secondary roots, some of them decaying, and (3) general stunting of the entire root system. Similar abnormalities were also found in barley and wheat but on the latter to a lesser extent.

Previous to these observations similar injury on young oat plants were observed when grown in nematode-infested soil in the greenhouse.

No nematodes were found inside the root tissue of any of the abnormal roots.

Spikelet-Drop of Oats

An apparently unknown diseased condition of oats was observed by this writer in Mississippi, characterized chiefly by necrosis of the rachillae and the subsequent dropping-off of individual spikelets. At first little attention was given to this condition but later (1952) it was found it affected some plantings to a considerable extent. It was found in two isolated plantings in South Mississippi made for the purpose of seed increases of two new strains of oats combining crown-rust and Victoria-blight resistance and derived from Winter Turf x Santa Fe, and Appler x Landhafer, respectively. It was also found on other commercial varieties, including Victoria-derived oats.

In 1953 this disease was found in Central Mississippi in 3 different commercial fields planted from the same source of seed. The crop was completely destroyed. Penetrating hyphae and spores of a species of Helminthosporium were found on the necrotic rachillae and on the glumes.

The writer wishes to request plant pathologists and oat breeders to be on the watch for this trouble. Further investigations are in progress.

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By Donald H. Bowman (Stoneville)

The 1953 season was very favorable for oat production in the Mississippi Delta despite the delayed start as a result of the 1952 drought. Yields and quality were generally quite high.

Diseases in general were negligible. In contrast to its relatively widespread occurrence in the two previous years, downy mildew, Sclerospora macrospora, was not found. Very little crown or stem rust was observed.

Small lots of seed of C.I. 6602, C.I. 6604, C.I. 6629 and C.I. 6666 were produced. Seed of all but C.I. 6666 is still available to anyone interested. Sixteen hundred bushels of pure seed of Delair, C.I. 4653, were distributed by the Delta Branch Experiment Station for 1953 planting.

Small grain in the Delta was delayed for the second year by lack of adequate moisture at planting time. A prolonged period of cold around the first of the year with temperatures dropping as low as 12-15° F. retarded growth but did no particular damage. At mid-February prospects are excellent for a good oat crop.

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MISSOURI

By J. M. Poehlman, Merle E. Michaelson, and C. L. Koehler (Columbia)

The 1953 season was unfavorable for oats in Missouri. At Columbia temperature reached 90 degrees or above in five days during May and 20 days during June. The total June precipitation was 0.96 inches. Most varieties were ready to harvest within 15 to 21 days after heading. Under these conditions, the oats ripened prematurely and were low in both yield and test weight. Columbia and varieties of Columbia origin, Mo. 0-200 and 0-205 ripened more normally than Andrew, Cherokee, or Clinton reflecting the superior adaptation of the Columbia types.

Performance at four locations in Missouri was as follows:

Variety	Yield bu/a	Test Weight lbs/bu	Crown Rust* %	Stem Rust* %
Mo. 0-205	40.4	29.9	20	5
Mo. 0-200	36.3	31.3	50	15
Columbia	35.4	29.6	50	25
Andrew	34.9	29.0	60	5
Clinton	31.7	27.8	70	20
Clintland	30.6	28.4	2	30
Clintafe	19.8	26.5	2	50

* Crown and stem rust notes from test at Bethany, Missouri only.

Diseases

With the hot, dry weather, there were no disease problems in the southern two-thirds of Missouri. Crown and stem rust caused considerable damage, especially to the Clinton variety, in the northern one-third of the state where wet weather in March had delayed planting. (See crown and stem rust notes from Bethany, above.) Reaction of the varieties made it apparent that Race 45 crown rust and Race 7 stem rust were the prevalent races. Only trace amounts of Race 8 stem rust were present.

Variety Recommendations

Mo. 0-205 and Andrew are the recommended varieties in Missouri.

Future Breeding for Missouri

Our breeding program is based on adding additional genes for stem rust resistance and stiffer straw to Mo. 0-205. For the former, the Hajira-Joanette gene for stem rust resistance is being added by the backcross technique. Sources of stiff straw being used are Craig-Afterlea and Clinton-Overland.

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NEBRASKA

By L. P. Reitz (USDA-Lincoln)

New varieties - Mo. 0-205 was released in Nebraska last year. It performed up to expectations, considering the adversities of the weather, except that it tended to lodge more than in previous years. It made good yields in state-wide trials and is now recommended in all districts.

Clintland was increased but no decision about release of the variety has been reached. It yielded slightly less than Clinton in most tests.

Breeding material - Good stem rust resistance and very stiff straw are possessed by about 100 elite lines from the cross Clinton x R. L. 1692. Resistance to races 7 and 8 under field conditions at Lincoln was rather clearly indicated. Most of these selections matured at the time of or earlier than Clinton this year. These will be in rod-row yield trials for the first time in 1954.

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NEW HAMPSHIRE

By Leroy J. Higgins (Durham)

The 1953 uniform variety oat trials were again confined to Durham. Thirty-eight varieties were grown in three replications for each variety.

The spring of 1953 was considerably delayed because of wet and cold weather and the planting was not made until April 30 on the dryest sandy loam soil in the field. In fact, the only area that could be worked into a well fertilized and manured seedbed at that time. Durham experienced a most severe and extended drought during June and July.

A summary of the comparative rainfall data follows for the four-month period:

	April	May	June	July	Total
1953	5.47	3.46	0.39	2.19	11.51
Normal	3.57	2.87	3.47	2.37	13.28
Difference	+1.90	+0.59	-3.08	-1.18	-1.77

All varieties matured earlier than average and were harvested July 30. There was very little lodging, less disease than usual and the yields were below average. Comparative yield averages for the ten-year period (1944-1953) follow:

	Forage Tons/Acre	Grain Bu./Acre
10-Year Average	3.86	64.14
1953	1.42	38.07
Difference	-2.44	-26.07

The new Clarion (C.I. 5647) once again outyielded Clinton in both forage and grain. Ajax gave slightly higher yields than did Clarion but both were in the leading eight varieties for both forage and grain.

It would seem that Ajax, Clarion and Clinton will be the leading oat varieties planted in New Hampshire for the 1954 season. Mohawk, Craig and Advance will be used if seed is available in the State.

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NEW JERSEY

By R. S. Snell (New Brunswick)

The state average oat yield of 37 bushels per acre was one of the highest recorded for the state. No leaf or stem rust was observed on any variety.

The variety Clarion looked good in trials scattered through central and northern New Jersey, but further trial is needed.

New Jersey grown LeConte winter oats were certified in 1953, the first certification of seed of this crop in the state.

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NEW YORK

By C. F. Konzak (Brookhaven National Laboratory, Upton, New York)

Further studies of some of the radiation induced race 7a resistant Mohawk mutants has shown that at least in a large number of cases, race 8 resistance appears to have been lost. However, it may be possible yet to select segregates which are resistant to both Races 7a and 8 since the heterozygous plants have this resistance.

Plants resistant to race 7a are also resistant to race 7. The reaction type of the race 7 and 7a resistant mutants is strikingly similar to that of Richland C.I. 787.

Experiments aimed at inducing Victoria blight resistance in susceptible varieties have, in the one test completed to date, yielded at least one mutation for non-susceptibility to blight in the Tama oat variety.

The rust reaction of these is not known, but is is hoped that if enough mutations can be induced, some may possess all of the crown rust resistance of Victoria.

The chlorophyll mutants found in Tama were somewhat different from those from Mohawk. Irradiated Mohawk produced no albinos and many banded-leaf types, whereas in the irradiated Tama oats there were a number of albinos, but no banded types were found. Other seedling mutants were similar for the two varieties.

Among the lot of material tested for blight resistance, several entire progenies were resistant. These may have arisen as admixtures with the original seed, or they may have been spontaneous or naturally originating mutants present in the seed which was irradiated. No special note was made as to the probability of the seed differing from that from other Tama plants, but the seedling growth habit of the plants was different. These results suggest that one must be extremely careful to space plant first generation irradiated seeds and to handle the progeny from each resulting plant as a separate unit.

The artificial induction of Helminthosporium blight resistance seems to be a very practical application of the radiation method. In addition, many other varieties need only plant height reduction or resistance to one form of rust to be returned to production. Such simple changes should be easily obtained by the radiation method at less than the cost necessary to incorporate a similar change by conventional breeding methods.

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By N. F. Jensen, R. B. Musgrave, L. J. Tyler and R. S. Dickey (Ithaca)

a) Final estimates of the New York Crop Reporting Service indicate that 670,000 acres of oats were harvested in New York in 1953. The total production of grain at an estimated 39.0 bushels per acre yield level was 26,130,000 bushels.

b) In 11 New York trials the following yields were obtained:

Variety	Yield bu./acre	Variety	Yield bu./acre
Sauk	76.7	Mo. 0-205	62.4
New Garry	75.2	Craig	59.6
N.Y. Sel. 611B-176-9	72.8	Clintafe	56.0
Ajax	71.6	Cherokee	55.6
C.I. 5441	66.6	Clintland	55.0
Branch	66.5	Advance	54.6
Beaver	64.9	Mohawk	54.0
Clarion	63.4		

c) Through the cooperation of the Winnipeg station a few bushels of the new Garry were obtained. Cornell has a small acreage under winter increase at Yuma, Arizona. Also under increase is a Goldwin x Clinton selection 611B-176-9. A final decision will be made on these two oats in 1954.

(d) Search for greater winter hardiness in oats continues (see previous Newsletters). Hybrid populations and populations from seed treated with X-rays and thermal neutrons by the Brookhaven National Laboratory are being watched for evidences of greater survival ability.

e) Fourteen collections of stem rust from New York were sent to Dr. E. C. Stakman and D. M. Steward for identification with the following results:

Race:	2	6	7	7B	12
Times collected:	1	3	7	1	2

f) A new graduate assistantship in oat research is being offered in the Department of Plant Breeding. Applicants may write to the Department for further information.

g) Copies of P.B. No. 52-19 "The Cereal Project at Cornell" are available on request.

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NORTH CAROLINA

By G. K. Middleton, T. T. Hebert, J. G. Moseman and W. H. Rankin (Raleigh)

Oat yields in North Carolina were at an all time high in 1953, with a state average yield of 38.5 bushels per acre. A persistent educational program stressing early seeding, adequate fertilization, and improved rust resistant varieties is paying off. Approximately 90 percent of the oat acreage is estimated to be in recommended varieties, chiefly Arlington, Victorgrain and Fulgrain.

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NORTH DAKOTA

By T. J. Conlon (Dickinson)

Oat Variety Trials

Yields were high in the oat variety trials at the Dickinson Experiment Station this year. The six top yielding varieties were C.I. 5440, a selection from the cross Clinton x Marion, which averaged 68.5 bushels per acre; Marion with a yield of 66.7 bushels per acre; Fortune, a Canadian variety, which produced 65.7 bushels per acre; Overland yielding 64.4 bushels per acre; Andrew which averaged 63.6 bushels per acre; and Cody at 63.2 bushels per acre.

Gopher oats, the old standard early maturing variety for this area, averaged 56.7 bushels per acre. Marida, the midseason variety which has been one of the consistently good yielders here, was particularly disappointing this year, being lowest of all varieties in both yield and test weight. Marida averaged 46.9 bushels of 32.0 pound grain.

Marida, Gopher, Clinton, Shelby and Victory were all badly damaged by oat stem rust this year, and the low yields and test weights produced by these varieties were due largely to the effects of this rust.

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OKLAHOMA

By H. C. Young, Jr. and D. F. Wadsworth

Diseases of Oats

The month of March, 1953, was wetter and cooler than normal for the area around Stillwater. Following this period yellow spots appeared in a 4-acre increase field of Missouri O-205 oats. These spots varied all the way from a few plants to areas 30 to 40 feet in diameter, and from a distance closely resembled the damage caused by an infestation of greenbugs. Closer examination indicated however, that no insects were present. The distal half or more of the leaves on the majority of the plants in these spots were yellow, and in many cases the tips were brown and dead. Some plants were found that had only a very slight yellowing, and at the other extreme some plants, usually near the center of the spot, were killed. Plants in all stages of symptons were critically examined, but neither insects nor pathogens could be found on these plants. Isolations were made from all of the plant parts, but yielded nothing except some common air-borne and soil saprophytes. Plants were sent to H. H. McKinney at Beltsville, Maryland, for tests for the presence of a virus disease, but he reported negative results. In the meantime, however, microscopic examination of the affected plants showed an abundance of asteroid shaped bodies within the roots, and the more severe the symptons on the plant the more numerous were the asteroid inclusions. These bodies corresponded closely in size and shape with the description of hypnospores of Asterocystic radicis de Wild, described by Vanterpool (Phytopath. 20:677-680, 1930). Some sporangio and zoospores were observed also. No inoculation tests were made, but by virtue of rather close association it is believed that the yellow spots which appeared in the field of O-205 were caused by this parasite. The disease did not materially affect the yield of this field so far as could be determined. The month of April was rather dry and warm, and within two to three weeks after the spots were first noted the new growth of the plants began to obscure the symptons. By the end of April the spots could no longer be distinguished. (Pictures of the field symptons are available on request.)

The excess moisture during March also brought about a rather heavy infection of bacterial stripe (Pseudomonas striafaciens (Elliott) Star and Burk.) in the fall-sown oat rust nursery. Among the named varieties in this test Dubois C.I. 6572, appeared to be the most resistant, followed by Le Conte C.I. 5107, Wintok C.I. 3424, and Lee C.I. 2042. Most seriously affected were DeSoto C.I. 3923, Coy C.I. 4600, and Atlantic C.I. 4599. Among the hybrids and selections the most resistant were: (Lee-Victoria) x Forkedeer^2 C.I. 5848, Woodward Composite Selection C.I. 4828, Colo x Wintok C.I. 5118, and Wintok x (Clinton^2 - Santa Fe), Stillwater Selection 513176.

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By R. G. Dahms, A. M. Schlehuber, and E. A. Wood, Jr.; Oklahoma Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture

The Reaction of Oat Varieties to Greenbug Attack

The greenbug, Toxoptera graminum (Rond.), is one of the most serious pests of oats in Oklahoma and adjoining states. Studies have been conducted at the Oklahoma Agricultural Experiment Station since 1947 on the reaction of small grains to greenbug attack. While most of this work has been done with wheat and barley, approximately 225 varieties of oats have been tested.

None of the varieties tested showed a high degree of greenbug resistance. Several varieties, including two spring types (Cherokee and Andrew), that are adapted to Oklahoma conditions were over 40 percent more tolerant than Wintok; however, due to the high susceptibility of Wintok, these cannot be considered resistant. Some of the more resistant barley varieties tested were over 300 percent more tolerant than the most resistant oat varieties.

To date, most of the oat varieties tested have been of local (United States) origin; however, with increased greenhouse facilities, the testing program with oats will be increased to include varieties from the world collection.

A manuscript embodying the results with oats and the other small grains has been prepared.

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By A. M. Schlehuber, B. R. Jackson and B. C. Curtis (Stillwater)

Fertilizer-Variety Response

That oats show high response to fertilizers has been known for a long time, but because of the practical importance of it from a farmer's viewpoint it bears repetition. The data in Table I show the grain yields from nine varieties of fall-sown oats at Stillwater (Perkins Agronomy Farm) for 1952 and 1953. As far as is known no commercial fertilizer had ever been applied to this land with the result that oat grain yields had been gradually reduced. The year 1952 was considered a good year in Oklahoma for the production of fall-sown small grains yet the average yield of the nine varieties was only 32.3 bushels per acre. In 1953, 150 lbs. of 10-20-0 was applied at seeding time and the average yield was 72.7 bushels per acre, an increase of 40.4 bushels or 125%. Further, there is some indication that there may be a variety-fertility lever interaction. For example, the yield of C.I. 6570 was increased only 78% whereas, the yield of Traveler was increased by 210%.

100 Bushel Oat Yields

Better management of the land and better varieties of winter oats are showing a definite affect on grain yields. Since the beginning of variety tests of fall-sown oats at Stillwater, only in 1952 and again in 1953 have we produced grain yields of 100 or more bushels per acre. The highest grain yields for fall-sown oat varieties grown at Stillwater for the period 1950-53 are shown in Table II. The season was more favorable in 1952 than in 1953 but in 1952 we applied 150 lbs. of 10-20-0 fertilizer before seeding so the highest yield was only 3.9 bushels less in 1952 than in 1953. It would appear that with good management and the growing of the best varieties, yields of 75 to 95 bushels per acre can be expected on our average soils.

Table I

Grain Yields From Fall-Sown Oat Variety Tests for 1952 (Unfertilized) and 1953 (Fertilized: 150# 10-20-0 per acre)
Stillwater, Oklahoma

Variety	C.I. No.	1952 (Bus. Per	1953 Acre)	Ave.	Diff. + 1953	% Inc.
Stanton Strain 1	3855	37.9	80.9	59.4	43.0	113
DeSoto	3923	34.3	79.5	56.9	45.2	132
Wd. Comp. Sel.	4829	35.0	71.9	53.5	36.9	105
Tennex	3169	37.6	69.0	53.3	31.4	84
Wd. Comp. Sel.	5106	29.2	76.4	52.8	47.2	162
Wintok	3424	28.9	75.8	52.4	46.9	162
Traveler	4206	25.1	77.9	51.5	52.8	210
Forkedeer	3170	31.9	67.5	49.7	35.6	112
Winter Fulghum Sel.	6570	31.1	55.4	43.3	24.3	78
Average		32.3	72.7		40.4	125

Table II

Highest Grain Yields from Fall-Sown Oat Varieties From 1950 Through 1953 at Stillwater, Oklahoma

Year	Yield (Bus. per A.)	Variety	C.I. or Sel. No.
1950	69.5	Mustang	4660
1951	73.8	W. Fulghum Sel.	6570
1952	106.8	Fulwin x (Lee-Victa)	6571
1953	102.9	C.I. 5106 x Traveler	Stw. 514033

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PENNSYLVANIA

By: Clarence S. Bryner (State College)

The 1953 oat crop was estimated at 27.4 million bushels from 740 thousand acres. Average yield this year was 37 bushels per acre compared to the 42-51 average of 32.2 bushels.

Craig has been added to the list of oats to be recommended and certified in 1954. Clinton 59, 11, and 11-25, Ajax, and Zephyr are the other spring varieties being certified. LeConte is the only winter variety being certified. Some Abegweit and Lorain are being sold in the state.

Clarion appears to do best where the phosphorus and possibly the potash level is high. It has a stiff straw, standing up well on plots receiving 90 pounds of nitrogen per acre.

Results of Nitrogen Fertilization Studies 1953 1/

Variety	Nitrogen Fertilizer Applied OLbs.	30 Lbs.	Difference Due to N	Average Yield/Acre
Craig	64.2	73.8	9.6	69.1
Andrew	61.8	68.4	6.6	65.2
Canadian Beaver	58.3	69.8	11.5	64.1
Shelby	58.4	68.0	9.6	63.3
Rodney	57.8	68.3	10.5	63.2
Mo. 0-205	58.9	66.9	8.0	63.0
Clinton	56.2	68.8	12.6	62.6
Clinton 59	57.6	67.4	9.8	62.5

(Continued on Next Page)

1/ Average of replicated trials at three locations.

Variety	Nitrogen Fertilizer Applied 0 Lbs.	30 Lbs.	Difference Due to N	Average Yield/Acre
Zephyr	55.4	69.4	14.0	62.5
Ajax	53.4	69.6	16.2	61.6
Abegweit	54.3	68.6	14.3	61.6
Lorain	55.3	67.6	12.3	61.5
Clarion	56.4	66.1	9.7	61.3
Mohawk	56.4	65.0	8.6	60.8
Clinton 11-25	54.7	66.5	11.8	60.7
Clintland	54.2	66.0	11.8	60.2
Exeter	55.4	64.3	8.9	60.0
James	51.1	65.1	14.0	58.1
Sauk	52.2	63.8	11.6	58.1
Fortune	51.2	63.8	12.6	57.6
Patterson	52.9	61.8	8.9	57.5
Roxton	53.8	59.8	6.0	56.9
Clintafe	45.1	63.0	17.9	54.1
Elmhurst	45.4	52.2	6.8	48.9
Sun	42.0	53.6	11.6	47.9

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SOUTH CAROLINA

By S. J. Hadden (Hartsville)

General Crop-Weather Relationships

The winter of 1952-53 was considered unusually mild "meteorologically", in that there were no severe cold waves and no killing of oats even among the least hardy spring types. "Physiologically" speaking, however, the winter and early spring period was decidedly cold, as shown by the below-normal mean temperatures in those months. Owing to the steady cold weather of early spring, response of the oat crop to spring top-dressings of N was very slow, and all small grain in the state got off to a very slow start. With the coming of warm weather in March and early April, recovery was quite rapid, resulting in a bumper oat crop throughout the state. Hot, dry winds blowing for several days in late May during the later maturation stages of oats did considerable damage by lowering test-weight and inducing an unusual type of lodging characterized by the breaking-over of the culms at the top inter-node. Had it not been for the damage caused by the hot winds, oat yields in South Carolina would probably have reached a record high.

The minimum temperature so far recorded at Hartsville (up to Feb. 12, 1954) was 16° F. occurring in mid-December, 1953. No outright killing has occurred, even of the least hardy varieties, but four degrees of foliar damage have been recorded in nursery plantings at Hartsville, Chester and Yemassee. Thus, those lines which would be expected to kill out with a lower temperature drop have been noted.

The Disease Situation

The new crown rust races (213 and 216) which attack the Victoria derivatives have not as yet been collected in this state, and, since upwards of 95% of the total oat acreage is planted to the Victoria derivatives (resistant to prevalent races), rust damage was negligible. Owing to persistently low temperatures in the spring of 1953, considerable difficulty was encountered in obtaining early spread of crown rust (races 45 and 57) even in a special disease nursery in the southernmost tip of S. C.

Helminthosporium blight (H. victoriae) was not found in the state in the 1952-53 season. This disease was noted in one field near Yemassee in the fall of 1953 but involved a history of very early seeding of untreated seeds. Losses from diseases of the state's oat crop have been remarkably low for the past several years. The two principal oat varieties are Victorgrain 48-93 and Arlington. The former variety is susceptible to one race of loose smut; the latter is likewise susceptible to but one (though different) race. This circumstance, together with improved seed-treatment practices, doubtless accounts for the extremely low incidence of loose smut in the South Carolina oat crop.

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TENNESSEE

By N. I. Hancock (Knoxville)

The seeding of rust nursery in early August of 1953 resulted again in heavy natural infections of rust on oats and wheat. Progenies of crosses having the Victoria source of resistance were considerably less susceptible than those of Santa Fe. This behavior of these sources is very similar to the one in 1952.

Prolonged rainfall and high winds before and at harvesting time in 1953 showed that Bond and Santa Fe were better sources of resistance to lodging than Victoria, Landhafer and Mindo.

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TEXAS

By I. M. Atkins and George Rivers (Denton - Texas Agricultural Experiment Station and the U. S. Department of Agriculture)

Production of oats in Texas in 1953 was 39,150,000 bushels or nearly 50 percent above the 10-year average crop and nearly twice that of the 1952 crop. Oats are grown in the Central part of the State where the seasonal conditions were very favorable. Diseases and insects were of minor importance this season.

The new varieties, Mustang and Alamo, gave excellent performance under farm conditions. The acreage of Mustang has expanded rapidly to an estimated 125,000 acres in 1953. Its cold resistance during the winter of 1953-54 has been of great value to farmers in returns from winter grazing alone. Alamo was distributed to certified growers for growing in 1954. The value of this early maturing, rust resistant variety was demonstrated in seven tests in 1953 where it yielded 52.0 bushels per acre or exactly twice that of New Nortex, which was damaged by heat and rust from spring seeding.

The red seeded sister strain of Mustang, Lee-Victoria x Fulwin C.I. 6571, was increased on a small scale but the decision on its release will not be made until results from 1954 tests are obtained. Its performance in 1953 was not as outstanding as in previous seasons.

In the breeding program, additional disease resistance is being added to the best commercial varieties now available such as Mustang, Alamo and New Nortex. Special attention is being given to obtaining protection from race 101 of crown rust, race 7a of stem rust and Helminthosporium blight.

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VIRGINIA

By T. M. Starling, C. W. Roane, and Ed Shulkcum (Blacksburg)

As a result of the extremely dry fall in Virginia many farmers were unable to get oats planted last fall. Many who did plant got poor stands and oats went into the winter with relatively little top growth. The same is true of barley and wheat plantings. It is expected that many of these farmers will make late winter plantings of winter varieties or plant spring oats. Fulgrain, Victorgrain 48-93, and Fulwood are recommended for late winter plantings in Virginia.

Mo. 0-205 is being recommended for spring planting in Virginia this year along with Andrew and Clinton.

The oat breeding work in Virginia is being conducted primarily at two locations. These are Blacksburg and Warsaw. Blacksburg is located in western Virginia at an elevation of 2000 feet and work here is directed toward developing more winterhardy varieties and spring varieties adapted to the higher and colder regions of the state. The fall planted nurseries at Blacksburg are rather poor this year as a result of the dry fall and poor stands obtained. Warsaw is located in eastern Virginia between the Rappahannock and Potomac Rivers. Work here is directed toward the development of winter varieties for the coastal plains regions of the state. Excellent stands were obtained at this location last fall and the nurseries are looking very good at this time.

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WISCONSIN

By H. L. Shands (Madison)

The average yield of all oats in Wisconsin in 1953 was 41.5 bushels per acre. This was less than in 1952 and also less than the previous 10-year average. It was estimated that losses from stem and crown rust were 7 and 5 percent respectively. The stem rust infection was greater than at anytime in the last 25 years. Race 7 was predominant in causing damage. Septoria was present, but was much less severe than in 1952.

Clinton, Shelby and other Bond derivatives having stem rust race 7 susceptibility had greater yield reductions than other varieties. In yield tests Ajax, Sauk and Branch had good records. Clinton, Clintland and Clintafe produced about 70 percent as much as the varieties named above. Branch seed was popular in Wisconsin the winter of 1953-54.

Clintafe, Clintland and Sauk were distributed to Wisconsin seed growers for the first time in the spring of 1954. The quantities of seed were about 3, 5 and 7 thousand bushels respectively.

The writer has been greatly aided by Dr. D. C. Arny, C. M. Brown and M. L. Kaufman, the later being a new assistant in the small grain breeding program.

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Steve Lund completed his Ph.D. training in June, 1953, having Septoria as a thesis problem. Dr. Lund is now extension Agronomist at Clemson College, South Carolina.

Charles M. Brown completed his Ph.D. training and will continue in oat breeding at the University of Illinois.

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ONTARIO AGRICULTURAL COLLEGE

By D. N. Huntley (Guelph)

Simcoe oats was a selection of the cross Ajax x Erban made at the O.A.C. in 1940. This variety matures about the same time as Ajax and is adapted to about the same conditions as that variety. However, it has larger kernel size, lower percentage of hull and resistance to loose and covered smut, and somewhat better tolerance of race 45, crown rust.

Like Ajax it is resistant to race 7, stem rust, but susceptible to races 8 and 10.

In tests in Ontario covering a seven year period, it has outyielded Beaver and Ajax which are the most widely grown varieties in Ontario. Unfortunately, the variety is not as strong strawed as Beaver.

In this respect it is about the same as Ajax. As yields of oats become greater due to better crop management, straw strength will be a very important factor. There is considerable emphasis on straw strength in the present breeding program at the O.A.C.

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NEW YORK

By R. B. Musgrave (Ithaca)

Rates of 0, 20, and 60 pounds of nitrogen per acre were applied to Goldwin, Mohawk, Ajax and Craig oat varieties at both Mt. Pleasant and Aurora Agronomy farms. The 20# application of nitrogen appeared to show the most profitable yield increase at both locations. In general, the 40# rate of nitrogen gave little increase or decreased oat yields, and the 60# rate depressed all yields. The Craig variety was the best yielder at Aurora, showing about a 7 bu. average increase over Ajax, the next highest yielding variety, and approximately 25 bu. increase over Goldwin and Mohawk. The trend was similar at Mt. Pleasant except that the yield differences were much less.

Experiments were conducted in 1953 on oats to determine the effect of various rates, sources, and dates of application of liquid nitrogen carriers. Ammonium Nitrate, Anhydrous Ammonia, 40% Nitrogen Solution, and 32% Urea Solution were applied to oats at 0, 20, 40, 60 pounds of nitrogen per acre. There were two dates of application (at planting, and at 5" - 8" stage of growth) of the Ammonium Nitrate and the 32% Urea Solution. In general, it appeared that there was no great difference in yield as a result of applying the various sources of nitrogen fertilizers. The 20# rate at planting was optimum for the Ammonium Nitrate and 40% solution, increasing yields from 5-10 bu. over the check plots treated with Anhydrous Ammonia and the 32% solution showed further benefits in yield (about 4 bu.) at the 40# rate, although there were exceptions. The late applications of Ammonium Nitrate and 32% solution decreased yields approximately 5-10 bu/A. when compared to planting time treatments.

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V. NEW OAT VARIETIES

		Page
Garry	(Winnipeg, Canada) (See also 1952 pp. 27) - -	23
Rodney	(Winnipeg, Canada) - - - - - - - - - - - - - -	23
Scotian	(Nappan, N.S. Experimental Farm, Canada) - -	22
Seminole	(Florida) - - - - - - - - - - - - - - - - - -	27
Shefford	(Macdonald College, Canada) - - - - - - - - -	22
Simcoe	(O.A.C., Canada) - - - - - - - - - - - - - - -	60
Sunland	(Florida) - - - - - - - - - - - - - - - - - -	27

Others:

Dupree	(South Dakota)
Waubay	(South Dakota)

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VII. EDITORIAL COMMENT

We regret the lateness of this issue and hope that a March or early April mailing date can be met next year.

There was fine cooperation on sending in citations for the publications section. We would like to add references to articles from foreign countries also.

We plan to print this issue on both sides of the page, hence the Newsletter will be much thinner than before. This is being done so as to qualify for the book rate in mailing.

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