1956

NATIONAL OAT NEWSLETTER

Vol. VII

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Sponsored by the National Oat Conference

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Neal F. Jensen, Editor

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I. CONFERENCE AND REGIONAL NOTES

Chairman's Report - National Oat Conference Executive Committee - January 31, 1956 to February 1, 1957

The National Oat Conference did not meet during the twelve months ending with February 1, 1957. However, several items of business have been transacted during the year.

Western region representation on the Executive Committee was brought to full strength with the appointment of Dr. F. C. Elliott, of Washington State College, as a second representative from that region. Dr. Elliott has subsequently resigned because he is changing to another field of research.

The report of the Committee on Reorganization of the National Oat Conference was presented at the Experiment Station Directors Meetings in the Southern, Northeastern, and North Central regions, for approval. In no case did the directors groups give official sanction to organizing the National Oat Conference for holding regular meetings. However, in each case the directors were sympathetic to having national work conferences for oat workers. If such meetings were held the individual directors were encouraged to send representatives.

A questionnaire relative to holding a National Oat Conference Meeting during the winter of 1957-58 has been submitted to the state and federal delegates. The replies to date indicate a favorable response.

Kenneth J. Frey
Chairman

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Secretary's Report - National Oat Conference

Executive Committee:

No meetings of the committee were held during the year. However, meetings of interest to the conference were held by the Southern Agronomists at Knoxville, Tenn., April 2-4, 1956 and by the Northeastern Agronomists at New York City, January 7, 1957. Reports will be made by the secretaries of those sections.

At both meetings new members were elected to the Executive Committee and at present its membership is as follows:

North Eastern Region:	N. F. Jensen and Steve Lund
North Central Region:	K. J. Frey (Chairman), E. G. Heyne, John Grafius

North Western Region:	Harland Stevens, Fred Elliott
Southern Region:	W. H. Chapman, T. M. Starling
USDA; ARS, Field Crops Branch:	H. A. Rodenhiser, H. C. Murphy
Editor of Newsletter:	N. F. Jensen
Secretary:	Franklin A. Coffman

A mail ballot is now being circulated by Committee Chairman, K. J. Frey to determine time and place of next meeting of the conference. The Oat Monograph Committee held an informal meeting of members present at the Annual Meeting of the Agronomy Society at Cincinnati, Ohio, November 14, 1956. Problems and progress on the Monograph were discussed.

Franklin A. Coffman
Secretary to Committee

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Meeting of Northeastern Small Grains Technical Committee
Hotel Sheraton-McAlpin, New York City
January 7, 1957

Representatives of six experiment stations met with USDA officials to consider progress reports on the regional research project NE-23. Plans were made to hold the next meeting the first week in January. Officers for 1957 are: Chairman, Steve Lund, New Jersey; Secretary, Collins Veatch, West Virginia; Representatives to the National Oat Conference are N. F. Jensen and Steve Lund.

Steve Lund, Secretary
1/21/57

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Report on the Oat Monograph

The preparation of the some 14 chapters for inclusion in the Oat Monograph is now well under way. However, the task is proving, as it was expected it would prove, a large assignment for all the different contributors. This is especially true since this task is added on to already full schedules and heavy work loads. However, all of the contributors are working diligently and progress is being made in preparing their contributions.

Certain individuals have been more fortunate than others in having assignments in the particular or special field in which they have worked long and intensively. Those have made progress more rapidly than others who have been confronted with the enormous task of reviewing the great mass of world literature on their subjects and then digesting and reducing this into chapter form for the Monograph.

To date about half the chapters are in advanced to comparatively final form. The size of this over-all undertaking and the work required by those contributing is realized most by those few who have attempted work of a similar nature under other assignments. It is expected, however, that the manuscript in its entirety will be finished and sent forward to the Agronomy Society editors rather early in the present calendar year.

The book, properly illustrated, is expected to approach some 350 to 400 printed pages when complete. As envisioned it should prove of particular value to all interested in oats, whatever their particular field. The problems confronted and the splendid work and excellent cooperation of all contributors is certainly much appreciated by the undersigned.

Franklin A Coffman, Editor
Oat Monograph

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Back Copies of Newsletter:

Copies of the Newsletter for the following issues are available as follows:

Year	Volume	Number of copies on hand
1950	1	11
1951	2	10
1952	3	44
1953	4	43
1954	5	41
1955	6	4

In the past, 200 copies have been mimeographed and bound, however, this proved to be too close to the demand in 1955 so 250 copies of the 1956 Vol. 7 issue will be prepared.

N. F. Jensen, Editor

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II. SPECIAL ARTICLES

Wild Oats in the East
By T. R. Stanton*

During the past two years some doubt has been raised in the writer's mind regarding the prevalent belief that wild oats (Avena fatua L.) will not survive, or overwinter, and produce seed as an annual weed in the eastern humid half of the United States. On this premise it has been assumed that wild oats would never become a troublesome weed pest in any region except in the drier areas of the western half of the United States where conditions are especially favorable for their natural mode of propagation. However, both in 1955 and 1956 wild oats were observed growing in fields of winter oats in several counties in the Coastal Plain or eastern seaboard area of South Carolina by the writer.

On inspection of these contaminated fields it was observed that many more plants of the wild oat were found growing along ditches and fences, or on land that was not cultivated, than were found as admixtures or rogues in the cultivated oats. This fact would rather definitely indicate that wild oats are now overwintering and surviving naturally in this area of rather mild winters having an abundance of precipitation fairly well distributed over the year. Furthermore, the cultivated seed sown was claimed to be free from wild oat seed, in fact, most of the contaminated fields had been sown to inspected or even certified seed.

As a consequence, the question naturally arises, how were the wild oats introduced into this area where they now threaten to become a serious weed pest? The writer is strongly of the opinion that they were brought in as a contaminant of commercial grain shipped into this section during fairly recent years to augment local feed supplies. The source of the seed being some wild oat-infected area of the western United States. There also is the possibility that they could have been introduced by shipping in baled hay or straw for feed or litter and thus be distributed to the land in manure or compost. Likewise, any theory that the wild oats had been blown in by strong winds, or carried by birds is exceedingly doubtful.

There also is the possibility that the wild oats could have started from contaminated experimental seed grown in field or nursery plots for tests of yield, quality, disease reaction, etc. However, such plantings have not been common in that area and no experiment station is located near enough to be a source of contamination.

So far, to the writer's knowledge, no comprehensive survey of the extent of distribution of wild oats in this area has been made. Definitely, they have been found in a few rather widely scattered fields in several adjoining counties embracing part of the very material tobacco-growing area of eastern South Carolina. Hence, whether the wild oats will continue to spread and eventually become a troublesome weed over a wider area remains a speculative matter. It would appear that some of the wild oat seeds can lie in the rather dry sandy soil during the winter and when conditions become favorable in early spring they will germinate and grow. Furthermore, it appears that a few of the seeds do not germinate immediately (probably because of delayed germination) or early enough for the

seedlings to be killed by occasional heavy freezes. It is known that the wild oat (Avena fatua) is even more tender than the tenderest cultivated spring varieties.

These wild oats observed appeared to be similar, if not identical, with the types common to the northwestern and western parts of the United States.

*Editor's note: Dr. Stanton has been ill during part of the winter yet took the time to submit four articles for the Newsletter. This is indicative of his continued interest in all phases of oat improvement. Dr. Stanton is one of the truly great "Oat Men of the Years" and his many friends wish him a speedy recovery.

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Studies on Yellow Dwarf of Oats in Illinois

R. M. Endo[1] and C. M. Brown

In 1956 an effort was made to determine the effect of the barley yellow-dwarf virus on the yield of oats, and to evaluate as many oat lines as possible to this damaging disease.

The effects of yellow dwarf were studied by comparing the yields obtained from diseased and healthy plants of three varieties of spring oats, namely Fayette, Clintland, and Rodney. Plants were infested on two different dates with viruliferous apple-grain aphids when the plants were in the 3-leaf and boot stage. A moderately virulent strain of the barley yellow-dwarf virus was used. The average infection in the noninoculated control and in plants inoculated in the 3-leaf and boot stage was 1.1, 93.8 and 15.6 percent respectively. Yield reduction for the three varieties inoculated in the 3-leaf and boot stages, respectively were: Fayette 94.3 and 10.4 percent; Clintland 94.4 and 21.8 percent; and Rodney 75.8 and 15.0 percent. Thus the extent of yield loss caused by yellow dwarf varied with the time infection occurred. This association undoubtedly resulted from the increased resistance of plants in the boot stage to infection and disease development. In addition the virus had a shorter period to produce its effects in the older plants.

When infection occurred in the 3-leaf stage, yield reduction resulted mainly from a highly significant reduction in the number of spikelets, and in the number of spikelets actually producing kernels. When plants were infected in the boot stage, yield reduction resulted from a reduction in the number of spikelets actually producing kernels, and from a slight reduction in kernel weight and test weight.

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[1]Name recently changed to R. M. Endo from R. M. Takeshita

Considerable progress was made in 1956 in evaluating oat seedlings to the barley yellow-dwarf virus. Approximately 3600 different oat lines were tested. The first and largest group tested was the "streamlined" world oat collection of the U.S.D.A. comprising 3318 entries. A second group of 139 entries was composed of the cooperative oat nurseries of the northeast (32 entries), northwest (30 entries), north central (51 entries) and southern (26 entries) oat-growing regions of the U.S. A third group included some advanced oat hybrids from Illinois (87 entries) and Minnesota (45 entries). A fourth and final group numbering 36 entries was obtained from the Plant Introduction Section of the U.S.D.A.

The technique used to evaluate the various oat accessions was a simple but effective one. Each entry was planted in a single four foot row, four hills per row. Roughly, 15-30 seeds were planted per hill, and each hill was planted one foot apart in the row. When plants were in the 2- to 3-leaf stage, viruliferous apple-grain aphids were placed in the center of two of the four hills. The remaining two hills were not infested and were retained as checks. Check plots were not infested since greenhouse experiments had demonstrated that small numbers (5-10) of virus-free aphids feeding for short periods on oat seedlings will not cause appreciable damage. The viruliferous aphids had been reared in the greenhouse on yellow-dwarf affected barley plants infected with a moderately virulent strain of the barley yellow-dwarf virus. The aphids were allowed to feed on the field plants for three days, following which the aphids were killed with an insecticidal spray. For six weeks thereafter, all field plants were sprayed at weekly intervals in order to reduce the amount of infection resulting from natural field spread of aphids.

Although there were some differences among the oat lines in the time required for symptoms to develop (9-18 days), none of the entries tested was immune. All of the entries eventually developed typical yellow-dwarf symptoms. The percentage of infected plants per hill varied from a low of 10% to a high of 100%, and averaged about 80%. In general, the two non-infested hills (controls) of each entry showed very low infection (4.0%) so that it was possible to measure the effect of the disease on each entry directly by comparing the diseased plants with the healthy checks.

Detailed notes were taken at the jointing stage, the heading stage, and when the plants were dead ripe. The following notes were taken:

1. A disease-severity reading for the leaf and leaf sheath.
2. An estimation of the number of leaves showing symptoms.
3. The amount of stunting.
4. An estimation of the amount of blast and reduction in the number of spikelets per culm.
5. An estimation of kernel plumpness.
6. An estimation of the number of spikelets actually producing one or more kernels.

There appeared to be no correlation between any of these factors. It was not possible, therefore, to predict the final performance (yield) of a particular accession on the basis of any of the first four readings. For example, certain varieties had appeared promising on the basis of a low amount of sunting and/or

blast. However, where these lines were given their final reading, it was found that most of the kernels had failed to fill normally. On the other hand, certain oat lines which had shown severe leaf symptoms, moderate to severe stunting of the plant, and moderate to severe blast, nonetheless developed rather plump, full kernels. It is possible that this was merely a result of favorable temperature and moisture conditions that existed during the time the grain was filling in a particular oat line rather than an indication of true disease tolerance.

The range of yellow-dwarf reaction in seedling oats appears to be very narrow and no immune or highly resistant line of Avena sativa was found. The following disease-severity classes were used:

1. Very highly susceptible: No panicle produced; plants may die prematurely.

2. Highly susceptible: Panicle usually produced; spikelet number reduced by more than three-fourths; most of the florets are sterile.

3. Highly susceptible: Panicle usually produced; spikelet number reduced by more than three-fourths; most of the grain filled less than one-half of normal.

4. Moderately susceptible: Panicle formed; spikelet number reduced by more than three-fourths; most of the grain filled from one-half to three-fourths of normal.

5. Slightly resistant: Panicle formed, spikelet number reduced by one-half to three-fourths; most of the grain filled one-half to three-fourths of normal.

6. Moderately resistant: Panicle formed, spikelet number reduced by one-half to three-fourths, most of the grain nearly normal.

Since oats are most susceptible at the seedling stage, it is hoped that some of the better lines will perform at a higher level of resistance when they are infected at still later stages of growth.

Of approximately 3600 oat lines tested in these preliminary trials, 635 will be retested in 1957. About one-half (315) are considered to possess some degree of resistance (moderately resistant, 10 lines; slightly resistant, 53 lines; and moderately susceptible, 249 lines). Four lines of Avena strigosa, (including Saia) appeared to possess a fairly high degree of tolerance to yellow dwarf. The remaining 318 lines were considered as probably fully susceptible, but deserving of further testing either because of poor seed set in the controls, low incidence of infection, or a considerable variation in reaction of individual plants. All of the previously mentioned 630 entries will be retested in the field in 1957. Although greenhouse tests are considered extremely valuable, there is no substitute for field testing since greenhouse-grown plants in contrast to field-grown plants are grown under much more favorable conditions of temperature and moisture.

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CI Numbers Assigned to Oats During 1956
by D. J. Ward

Number	Designation	Source
7166	Osage x ([Bonda x Hajira-Joanette) x Santa Fe]	USDA, Idaho
7167	" " "	" "
7168	" " "	" "
7169	" " "	" "
7170	" " "	" "
7171	Selecta D.L. 41372, P.I. 185783	Iowa (Argentina)
7172	D.L.M. 3, P.I. 197278	"
7173	Clinton^2 x Arkansas 674	Indiana
7174	" "	"
7175	" "	"
7176	" "	"
7177	" "	"
7178	Grey Algerian, Ind. sel. 5 from P.I. 183106	" (Kenya)
7179	" " Ind. sel. 17 from P.I. 183106	" "
7180	" " Ind. sel. 19 from P.I. 183106	" "
7181	K.-H.-C. R.-48, Ind. sel. 3 from P.I. 174544	" (France)
7182	[(Lee-Victoria x Fulwin) x (Bond x Anthony)] x Landhafer	Mississippi
7183	Goldwin x Clinton	New York
7184	" "	"
7185	Goldwin x Victoria-Rainbow	"
7186	" "	"
7187	" "	"
7188	" "	"
7189	Huron (x-rayed)	Iowa
7190	Clinton^2 x Arkansas 674	Indiana
7191	L.I.A.S. 49-1663	Brazil
7192	Early Clinton: Okla. 5111635	Oklahoma
7193	(Columbia x Victoria-Richland) x Mindo: Mo. 0-04613	Missouri
7194	Cherokee Reselection: Nebr. 52753	Nebraska
7195	Nemaha x Neosho-Landhafer	Kansas
7196	Beacon x Hawkeye-Victoria: Wisc. X436-7	Wisconsin
7197	Clinton x Andrew: Ohio 54T N-14	Ohio
7198	[Landhafer x (Mindo x Hajira-Joanette)] x Andrew: Minn. II-50-83	Minnesota
7199	[Landhafer x (Mindo x Hajira-Joanette)] x Andrew: Minn. II-50-119	"
7200	Marion x Clinton: Ill. 45-2837	Illinois
7201	Vicland x (Branch x Clinton^2-Santa Fe): Wisc. X486-8	Wisconsin
7202	GA 52: (Vicland x Erban)	Ontario
7203	Scotian: (Vanguard x Erban)	Nova Scotia
7204	[Landhafer x (Mindo x Hajira-Joanette)] x Clinton: Minn. II-50-27	Minnesota

Number	Designation	Source
7205	(Landhafer x (Bond-Rainbow x Hajira-Joanette)) x Clinton: Minn. II-50-55	Minnesota
7206	(Landhafer x (Bond-Rainbow x Hajira-Joanette) x Andrew: Minn. II-50-61	"
7207	do Minn. II-50-62	"
7208	(Landhafer x (Bond-Rainbow x Hajira-Joanette) x Andrew^2: Minn. II-50-126	
7209	Shield: (Roxton x (Victoria x Hajira-Banner, R.L. 1276) x (Ajax x R.L. 1276)): 3928 Kap. 2-2	Ontario
7210	Goldwin x Boone: N.Y. 556a2-9-4	New York
7211	Goldwin x (Victoria-Rainbow, C.I. 4192): N.Y. 618a1-4-6	"
7212	Forvic x Hawkeye-Victoria: X216-22	Wisconsin
7213	Ajax x Hawkeye-Victoria: X216-23	"
7214	Wintok x Lee: Ky. 54-773	Kentucky
7215	Fulwin x Wintok: Ky. 53-820	"
7216	Fulwin x Wintok x ((Red Rustproof x Victoria-Richland) x Lee): Ky. 54-829	"
7217	Fulwin x Victorgrain: Ky. 54-1032	"
7218	Victorgrain x Fulwood x (Arlington-Delair x Trispernia, C.I. 6908): Coker's 56-18 x 53-29.	South Carolina
7219	Victorgrain x (Bonda x Hajira-Joanette x Santa Fe): X51LX	USDA
7220	Arlington x (Wintok x Clinton^2 x Santa Fe, C.I. 6740): X53EG	"
7221	Advance x New York Sel.: N.Y. 5032aB-2B-35	New York
7222	New York Selection x Craig: N.Y. 5045aB-2B-14	"
7223	Hairy Culberson x New York Sel.: X51AH	Kansas
7224	((Fulwin x Lee-Victoria, C.I. 4382) x Bonda) x Landhafer; Ark. C4-4-5-1	Arkansas
7225	(Fulwin x Lee-Victoria, C.I. 4382) x Bonda: x37J	USDA
7226	((Red Rustproof x Victoria-Richland: C.I. 3717) x (Lee-Victoria x Fulwin, Sib C.I. 4316)) x (Clinton^2-Santa Fe)	"
7227	do	"
7228	do	"
7229	(Arlington-Delair x Trispernia, C.I. 6908) x (Bond-Fulghum x Victorgrain): Coker's 56-38	South Carolina
7230	Wintok x Santa Fe: H 1617-x-2	Georgia
7231	Carolina Red x Clinton^2-Santa Fe	Mississippi
7232	A. abyssinica x A. strigosa: Tetraploid Abd. 54SP101	Iowa-Ontario
7233	A. abyssinica (Iowa Sel from P.I. 193958)	" (Ethiopia)
7234	(Clintland Type)^6 x (Clinton-Boone x R.L. 2105): Ind. 5413	Indiana
7235	Rodney x (Landhafer x Forvic): Wisc. X552-1	Wisconsin
7236	Victorgrain 48-93 x (Bond-Rainbow x (Hajira-Joanette x Landhafer)): Tifton 1066	Georgia

Number	Designation	Source
7237	(Lee-Victoria x Fulwin) x Clinton^2-Santa Fe: Delta 5205-5	Mississippi
7238	((Red Rustproof^2 x Victoria-Richland) x (Lee-Victoria x Fulwin)) x Clinton^2-Santa Fe: Delta 5105-8	"
7239	Victorgrain x (Bonda x Hajira-Joanette x Santa Fe): Md. 56-114 & 308	USDA
7240	(Bonda x Hajira-Joanette x Santa Fe): Minn. Sel. x Mo. 0-205	USDA, Idaho
7241	Clinton^2 x Arkansas 674: Ind. 461-A1-3-49	Indiana
7242	Clinton^3 x Arkansas 674: Ind. 491 A3-5-4	"
7243	Clinton^2 x Arkansas 674: Ind. 461 A1-6-8-2-1	"
7244	Clinton^3 x Arkansas 674: Ind. A4917A3-40	"
7245	do Ind. A4917A364	"
7246	Clinton^2-Arkansas 674 x Clinton-Cartier: Ind. 4919 A1-49	"
7247	Grey Algerian, Ind. Sel. 5 from P.I. 183106	" (Kenya)
7248	do Ind. sel. 17 from P.I. 183106	" "
7249	do Ind. sel. 19 from P.I. 183106	" "
7250	K-H-C R.48, Ind. sel. 3 from P.I. 174544	" (France)
7251	P.I. 184019	Yugoslavia
7252	P.I. 184002	"
7253	Delair x (Bonda x Hajira-Joanette x Santa Fe)	USDA
7254	Libertas	Wash. (Holland)
7255	((Bond-Fulghum, Fla. 167 x Santa Fe x Clinton) x Colo-Fultex, C.I. 5208) x (Fla. 167-Landhafer, C.I. 5919 x Canuck)	Florida
7256	Weibulls 16004	Wash. (Sweden)
7257	Wodan	" (Holland)
7258	(Trispernia x Clinton^2 x Santa Fe) x (Atlantic x Clinton^2 x Santa Fe): X49E	USDA
7259	(Letoria x Clinton^2 x Santa Fe) x Arlington: X52B-2	USDA
7260	Atlantic x (Clinton^2 x Santa Fe): X47CH	USDA
7261	Atlantic x (Clinton^2 x Santa Fe): X47AV	USDA

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A Disappointing 1956 Oat Crop
by H. C. Murphy (USDA)

The 1956 oat crop of 1,152,652,000 bushels was the smallest since 1944, and 23 percent smaller than the near record 1955 crop of 1,502,074,000 bu. The small 1956 crop resulted from a sharply reduced total harvested acreage of 33,639,000 acres and a relatively low average yield of 34.3 bushels per acre, both caused to a

considerable extent by heavy drought damage in the normally heavy producing area extending from Kansas to South Dakota and including western Iowa. In addition to the usual diversion to hay, pasture, silage and other uses, more oats than any other crop were destroyed in connection with the 1956 Soil Bank Program.

Production in the North Central Region was the smallest in 12 years. In contrast with the record yield and total production in 1955, the 1956 crop was a disappointing one. Estimated at 893,539,000 bushels, it comprised only 78 percent of the total United States production. This is in contrast with 83 percent for 1955 and an average of 82 percent for the past ten years. In addition to the heavy losses in yield and abandonment due to drought, heavy rains caused lodging and harvest losses in Minnesota, Wisconsin, Michigan, Illinois, Indiana and Ohio. Although no near record yields were obtained, Illinois, Wisconsin, Indiana and Ohio produced average yields of 47, 46, 45 and 43 bushels per acre, respectively. In contrast, the average yields in Nebraska, South Dakota, Kansas, North Dakota and Iowa were only 12, 20, 21.5, 29 and 29.5 bushels per acre, respectively. Minnesota, Iowa, Illinois and Wisconsin were again the "Big Four" in oat production. They accounted for 65 percent of the North Central production and 50 percent of the Nation's total 1956 oat crop.

Despite late planting, and as a result of ample rainfall in July and August and below normal temperatures during maturity, oat yields in the Northeastern Region were above 1955. Total production was down 10 percent, however, due to reduced acreage. The 1956 production of oats in the Southeastern and South Central States was higher than in 1955, but lower in the Western Region.

Losses from oat diseases in the United States in 1956 probably were the lowest during the past 30 years. Environmental conditions were generally unfavorable for disease development in the high producing northern areas, and in the critical southern areas where rust usually overwinters and northward movement is initiated. The estimated total loss from all oat diseases in Iowa in 1956 of 2.6 percent was the lowest recorded during the past 30 years, and probably the lowest on record. It compares with an estimated total loss of 10.5 percent for the near record 1955 oat crop, and to 29.7 percent for the past ten years.

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Observation On Oats Grown In Yield Nurseries In The National Cooperative Coordinated Oat Breeding Nurseries 1955-56

By F. A. Coffman, H. C. Murphy and Harland Stevens[1]

As in previous years one or another of the writers visited most of the cooperating stations growing the Uniform Regional Nurseries in 1955-56 and the following general observations can be made:

1. Weather conditions during the season of 1956 can best be described as "spotty." For example, drought prevailed in western Iowa, Nebraska, Kansas, and Oklahoma,

but most oat yields averaged well above 100 bushels per acre at Lafayette, Indiana.

2. Rusts did little damage anywhere in 1956.

3. Soil moisture was deficient in the fall in some areas of the South and oats emerged to uneven stands in such sections.

4. The winter of 1955-56 was not unusually cold, but because it was so prolonged oats suffered considerable winterkilling in some sections.

5. In some areas soil moisture was deficient in the spring and oats were "dusted in."

6. The spring of 1956 was extremely backward almost everywhere and spring oats were seeded late and started off very slowly.

7. As a result of cool spring weather oats were much shorter than average on many stations. This tended to reduce yields.

8. Droughty conditions prevailed almost throughout the crop season in some important oat-producing areas. This was especially true in part of Iowa, Nebraska, Kansas, Oklahoma, northern Texas, and eastern Colorado. Yields, therefore, were unusually low and at some points the crop failed.

9. In the northern part of the northeast area cold weather continued almost all season and oats matured unusually late and harvest was much delayed.

10. Crop conditions in most of the northwest area were comparatively favorable and yields comparatively good on the average, on irrigated stations, but were not so favorable as in 1955 on dryland stations. At Aberdeen, Idaho, (irrigated) several entries averaged in excess of 200 bushels per acre.

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[1]Agronomist, Oat Investigations; Pathologist in Charge Oat Investigations; Agronomist, Field Crops Research Branch, A.R.S., U.S.D.A., respectively.

(A) FALL SOWN OAT NURSERIES

Yield Rank	Variety or C.I. No.[1]	Yield (Bu.)	Test (Lbs.)	Height (Ins.)	Lodging %	Date Headed	Surv. %	Forage Rating[2] %
	Northern Winter Oat Nursery (20 Stations)[3]							
1	7132	65.4	36.1	32.3	37.9	5/18	65.9	99.4
2	6903	63.8	34.4	31.5	19.7	20	67.7	104.2
3	6902	63.8	32.6	33.7	41.4	15	57.5	101.9
4	7128	63.1	33.8	27.3	19.2	16	52.9	100.5
5	6904	61.7	31.7	30.2	34.2	20	56.5	101.1
	Central Area Winter Oat Nursery (16 Stations)							
1	Local check	79.5	33.2	39.5	3.4	5/1	93.1	107.6
2	6717	78.7	32.2	38.8	26.4	6	91.7	93.9
3	6994	76.8	33.8	39.2	22.8	4/26	73.7	106.8
4	Victorgrain 48-93	75.3	32.2	38.0	19.8	4/27	65.9	102.4
5	Arlington	74.8	33.0	41.8	10.2	30	64.0	103.8
	Southern Winter Oat Nursery (10 Stations)							
1	Victorgrain	64.0	32.6	44.6	49.3	4/13	93.5	106.9
2	Seminole	59.2	30.7	43.1	33.0	3/30	91.0	118.7
3	Victorgrain (Miss. HVR)	58.8	32.2	45.4	57.0	4/13	94.5	107.9
4	7155	58.6	34.6	39.1	63.7	10	95.0	111.9
5	6744	55.1	32.6	44.0	36.7	11	96.0	114.6

(B) SPRING SOWN NURSERIES GROWN EAST OF THE ROCKIES

Yield Rank	Variety or C.I. No.[1]	Yield (Bu.)	Test (Lbs.)	Height (Ins.)	Lodging %	Date Headed	Surv. %	Forage Rating[2] %
	Northeastern States Uniform Nursery (9 Stations)							
1	Craig	73.0	31.7	34.0	32.3	7/1		
2	7211	72.9	31.1	42.0	27.5	3		
3	Scottian	72.3	31.9	43.0	14.3	6/30		
4	5982	71.4	32.9	39.0	16.3	26		
5	Imp. Garry	70.9	31.6	40.0	16.3	30		
	North Central Uniform Nursery (11 Stations)							
1	Simcoe	66.9	28.9	33.0	36.0	6/19		
2	6608	66.3	32.0	30.0	18.0	14		
3	Garry	66.0	28.7	33.0	18.0	20		
4	6939	65.8	32.3	31.0	26.0	17		
5	70.83	65.1	29.5	30.0	41.0	15		
	Uniform Spring-Sown Red Oat Nursery (15 Stations)							
1	Andrew	50.9	30.8	28.0	23.1	5/31		
2	6632	50.9	29.2	26.5	25.3	6/1		
3	6639	49.2	30.4	27.8	15.8	2		
4	6926	49.0	31.0	27.6	26.5	1		
5	Mo. 0-205	48.1	31.8	28.8	15.6	3		

(C) SPRING SOWN NURSERIES GROWN WEST OF ROCKIES

	Northwestern States Nursery (11 Irrigated Stations)							
1	Centore	120.7	36.5	37.0	12.0	6/17		
2	Exeter	117.4	36.7	41.7	11.0	23		
3	5347	117.2	37.2	40.4	5.1	20		
4	5345	117.1	37.5	37.9	1.4	20		
5	Craig	116.8	36.6	35.0	2.7	17		
	Northwestern States Nursery (12 non-irrigated Stations)							
1	Eagle	85.2	36.1	37.0	13.3	6/28		
2	Shasta	83.4	32.9	43.0	17.7	7/1		
3	Exeter	83.2	34.8	38.0	7.7	6/30		
4	Park	81.7	35.2	35.0	16.0	28		
5	5346	81.2	35.7	36.0	8.3	26		

KEY TO C.I. NUMBERS:

7132 (Traveler x (Red Rust. x Victoria-Rich.)) x Fulwin x Wintok
6903 (Lee Victoria) x Forkedeer
6902 Stanton: Okla. Selection
7128 Cimarron x Traveler
6904 (Lee-Victoria) x Forkedeer
6717 (Lee-Victoria) x Fulwin
6994 Tennex x (Victoria x Hajira-Banner)
7155 (Arlington-Delair) x Trispernia
6744 (Victoria x Hajira-Banner) x (Fulghum-Victoria)
7211 Goldwin x (C.I. 4192: Victoria x Rainbow)
5962 (Roxton x (Victa. x Haj.-Ban.)) x (Ajax x (Victa. x Haj.-Ban.))
6608 (Victoria x Hajira-Banner) x Colo
6939 (Victoria x Hajira-Banner) x Spooner
7083 (Landhafer x (Mindo x Hajira-Banner)) x Andrew
6632 Andrew x Landhafer
6639 Andrew x Landhafer
6926 (Columbia x Marion) x Mindo
5347 (Anthony x Bond: C.I. 4189) x Overland
5345 Clinton x Overland^2
5346 Clinton x Overland^2

Based on agronomic data presented, the following comments can be made. C.I. 7132, a new oat in these experiments, appears to be hardy, productive and to have a high test weight. Its straw is weak and crosses should be made for improving it in that respect. C.I. Nos. 6717 and 6903 continue to perform well and should prove good parental material for crosses. Seminole continues to be a high producer in the deep South and Victorgrain and Arlington in areas where winters are a little more severe. All are well proved oats and should be utilized more in crossing.

In the Northeast Craig continues to perform well. It is a good oat also in western irrigated areas. So far Craig has been little used and it would seem advisable to use it more as a parent. The new oats C.I. 7211, Scotian, and C.I. 5962 performed well and appear suitable for parental material. C.I. 5962 was a good entry in the North Central States nursery also.

Simcoe made a good showing in the North Central States, but its straw is comparatively weak. C.I. Nos. 6608 and 6939 both yielded and tested well. Garry continues to make an excellent record in that area.

In the spring red oat area Andrew x Landhafer, C.I. Nos. 6632, and 6639 continue to produce well but both are a little weak in straw strength and light in test weight. Early Clinton, a new entry in the same nursery was particularly outstanding in 1956, both as to earliness and as to test weight but was not outstanding in yield.

In the Northwest, Centore, sister of Cody and Overland, made a good yield record on irrigated stations and Park on non-irrigated, whereas Exeter yielded well on both irrigated and non-irrigated stations. The three unnamed oats C.I. Nos. 5345, 5346 and 5347 continued to rank high in 1956. The first two are sisters to Park and very similar to it.

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Yield and Quality of Spring-sown Winter Oats in Massachusetts
by T. R. Stanton

In the 1955 National Oat Newsletter, Bespalov and Roseau (pp. 9-11) reported interesting results on winter oat varieties grown from early spring seeding at Feeding Hills, Massachusetts. The data on yield of grain and groats in bushels per acre were especially interesting to the writer. Of the 17 winter varieties and selections, Lee ranked first in yield and grain (67.6) and groats (53.4). Lemont Cross ranked second in yield (62.6) of grain but third in yield (49.2) of groats whereas Cimmaron was third in yield of grain (61.8) but second in yield of groats (50.0). The fourth highest-yielding was Early Wintok with 58.8 and 47.3 bushels, respectively; Forkedeer was fifth with 58.9 and 45.6 bushels, respectively. The spring varieties, Clarion and Roxton, ranked sixth and seventh with 58.2 and 42.9 bushels of grain, respectively, and 57.0 and 44.8 bushels of groats, respectively. The lowest yielding of the 17 varieties of winter oats was the New York selection (Winter Turf type) with 25.3 bushels of grain and 19.8 bushels of groats. As previously indicated the most interesting feature of these data is the superior showing made by the Lee variety. One of the parents giving rise to Lemont was Lee which also made a good showing.

It is known that Lee has been a high quality oat in its best range of adaptation. This character appears to have been transmitted from Aurora, one of the parent varieties of Lee. Aurora is not a typical winter oat such as the Winter Turf parent, although it apparently carries a few genes for winter resistance. In results of tests made many years ago at the Arlington Farm in Virginia, Aurora was shown to be an oat of excellent quality with a short, plump, smooth groat and a very thin, yellow hull. The late Edgar S. McFadden, of the Texas Agricultural Experiment Station, once remarked to the writer that of all the many oat varieties it had been his privilege to observe, he never saw one that he thought was the equal of Aurora in quality and was wondering why more breeders had not used it in oat crosses.

As a consequence, it may be that oat breeders are overlooking a potential in the Aurora variety, especially in breeding for quality. The one most undesirable character of Aurora has been its high susceptibility to the oat smuts. Aurora was selected from Red Rustproof oats at Arlington, Va., by the late C. W. Warburton nearly 50 years ago. It is not known whether it occurred as an aberrant or a rogue. Other facts indicated by these data on the relative performance as between winter and spring oats grown from early spring seeding in Massachusetts have been

emphasized by the writers of the article. These data seemed to the writer to be worthy of further publication in the Agronomy Journal, or some other journal, with a much wider circulation.

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Do Insecticides Alter the Toxicity of Mercurial Seed Treatment?

W. F. Crosier, New York State Agricultural Experiment Station, Cornell University, Geneva, N.Y.

Formulations containing a chlorinated hydrocarbon insecticide as well as a mercurial fungicide are available commercially for the treatment of oat seeds. Although wheat seed lots have appeared to be injured by a combination pesticide, oats have tolerated normal dosages. With the substitution of aldrin for lindane, phytotoxic reactions in germinating oats and wheat decreased markedly.

In order to avoid the possible phytotoxic effect of a liquid solvent, uniform lots of Anthony oats were treated first with a mercurial, then subdivided and treated with an insecticide dispersed in talc. The names and treating rates (ounces of fungicides per bushel of oats) of the mercurials are: Ceresan M2X, 0.25; Ceresan 200, 0.25; Mema standard, 0.25; Panogen 15, 0.75; and Setrete, 0.5. The insecticides dispersed in talc and treating rates are: 25% aldrin, 2; 25% diazinon, 2; 50% dieldrin, 1; 25% heptachlor, 2; and 25% isodrin, 2 ounces per bushel of seed.

Quart fruit jars were filled with the treated oats and held at 20°C. Seeds were removed after 7 days for field trials, after 9 weeks for germination tests, and after 61 weeks for storage-germination tests.

As shown in Table 1, neither the organic phosphate, diazinon, nor the chlorinated hydrocarbons interfered with the control of the surface-borne smuts. On the contrary, both heptachlor and isodrin significantly reduced the incidence of smut. The slowly volatile mercurials, Mema and Setrete were markedly supplemented as measured by the decrease in smutted panicles in rows grown for seed that received heptachlor and isodrin.

Since a rich spore suspension of the smut fungi had been added to naturally infected seed the smut was difficult to control. Heptachlor and isodrin may have been beneficial by increasing the volatility of Mema and Setrete. The seed was not treated with insecticides alone, so their possible fungistatic value was not measured.

During germination certain fungi, Alternaria tenuis, Penicillium spp. and Rhizopus nigricans developed profusely on non-treated seed. The mercurials alone reduced these infestations and the insecticides seemed not to contribute to these reductions.

The data in Table 1 do not indicate that any insecticide was markedly phytotoxic, although the individual records show that the Ceresan M2X-heptachlor combination was injurious to the stored seed.

The insecticides in general did not influence the emergence of seedlings from either sterilized or contaminated soil. Isodrin, however, may have supplemented the mercurials in protecting the seed from soil-borne fungi.

Table 1. Effect of Fungicides and Insecticides upon Disease and Seedling Development in Anthony Oats.

Pesticide, commonly used name	Pct. seedling emergence, greenhouse		Pct. seedlings on towels: Normal growth		Chemically injured		Mold fungi		Pct. of smutted panicles
Fungicides Alone									
Ceresan M2X	93	65*	90	68*	0	1*	1	3*	1.2
Ceresan 200	84	68	89	76	0	1	2	3	3.5
Mema st.	93	64	92	80	Tr	0	9	16	5.1
Panogen 15	92	69	88	75	1	0	2	9	2.9
Setrete	86	62	85	80	0	1	6	6	4.9
None	86	59	90	79	0	0	76	78	13.1
Average of Five Insecticides Plus									
Ceresan M2X	91	62	88	70	1	3	3	1	0.9
Ceresan 200	86	71	88	79	1	1	2	1	2.4
Mema st.	88	67	91	77	Tr	Tr	10	13	4.2
Panogen 15	89	68	86	77	1	1	5	3	1.7
Setrete	85	66	85	83	0	Tr	9	27	4.1
Average of Five Fungicides Plus									
Aldrin	86	64	86	75	Tr	0	10	13	5.2
Diazinon	85	64	87	72	Tr	1	6	17	4.2
Dieldrin	87	67	87	82	Tr	Tr	7	9	4.4
Heptachlor	91	62	90	78	1	4	3	2	2.2
Isodrin	90	74	89	80	1	1	3	4	2.7
None	88	64	88	71	Tr	1	5	7	5.6

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The United States Program for the Maintenance and Evaluation of World Small Grain Germplasm

by David J. Ward

Small grain collections have been maintained by the Cereal Crops Section, Agricultural Research Service, United States Department of Agriculture, for more than fifty years. Seed of most of the strains in the collections has been obtained by the Plant Exploration Section of the Agricultural Research Service. The World Collection seed stocks are acquired and maintained to serve the needs of numerous plant improvement programs in the United States and other friendly nations. The Cereal Crops and Plant Exploration Sections are cooperating in this work.

The flo-chart accompanying these comments illustrates the program developed in the U.S.D.A. for maintaining and evaluating materials in the World Collections of Wheat, Barley, Oats, Flax, and Rye.

Viable seed stocks representing the broadest possible cross section of world small grain genotypes are essential to an effective small grain improvement program. Accordingly, the propagation and maintenance of the available World Collection seed lots is considered to be of prime importance.

The suitability of individual strains for use in plant improvement work can only be brought to light by evaluating their traits. Some of the characters required to meet the needs of the different grain growing areas relate to adaptive qualities of the strains. These can best be evaluated in the area where they may be grown. Special facilities and personnel are required for testing many plant characters. No single experiment station can provide the staff, equipment, land space, etc., necessary for dealing with all of the facets of small grain improvement work. These things indicate the desirability for an extensive preliminary evaluation program designed to expose the plant materials to the widest possible diversity of environment and to make the most effective use of the available personnel and facilities.

Data acquired from tests of plant materials at one location are frequently of value to workers at other locations. Toward this end, cooperators in the small grain germplasm evaluation work are requested to submit copies of their notes on collection materials to a central location where the data may be cataloged. Several millions of such notes are on record in conjunction with the collection seed stocks in the Cereal Crops Section at Beltsville, Md. Over the past several years, more than thirty compilations of segments of these data have been distributed to workers cooperating in the germplasm evaluation work.

In some instances, it has been possible to use the notes accumulated from several preliminary tests to evolve select groups of strains warranting intensive testing at many locations. This is a constant objective in evaluating the data accumulated on the collection materials.

A research study has been initiated using data recorded on some spike characters in barleys from the collection together with information about the source of the seed. Consideration has been given to the frequency of occurrence of the characters individually and in combination with one another and to their areas of distribution in the world. This study shows promise of revealing some information about the evolutionary background of barleys. It also has served to indicate areas of greatest concentration for the individual characters involved. This type of information may be useful in carrying out effective explorations for plants. It is expected that this approach will be followed in studying other characters of small grains as they occur in the collections.

The flourishing cooperative relationships among small grain workers have made possible an effective small grain germplasm evaluation program. It is another example of how we can best serve ourselves by serving one another.

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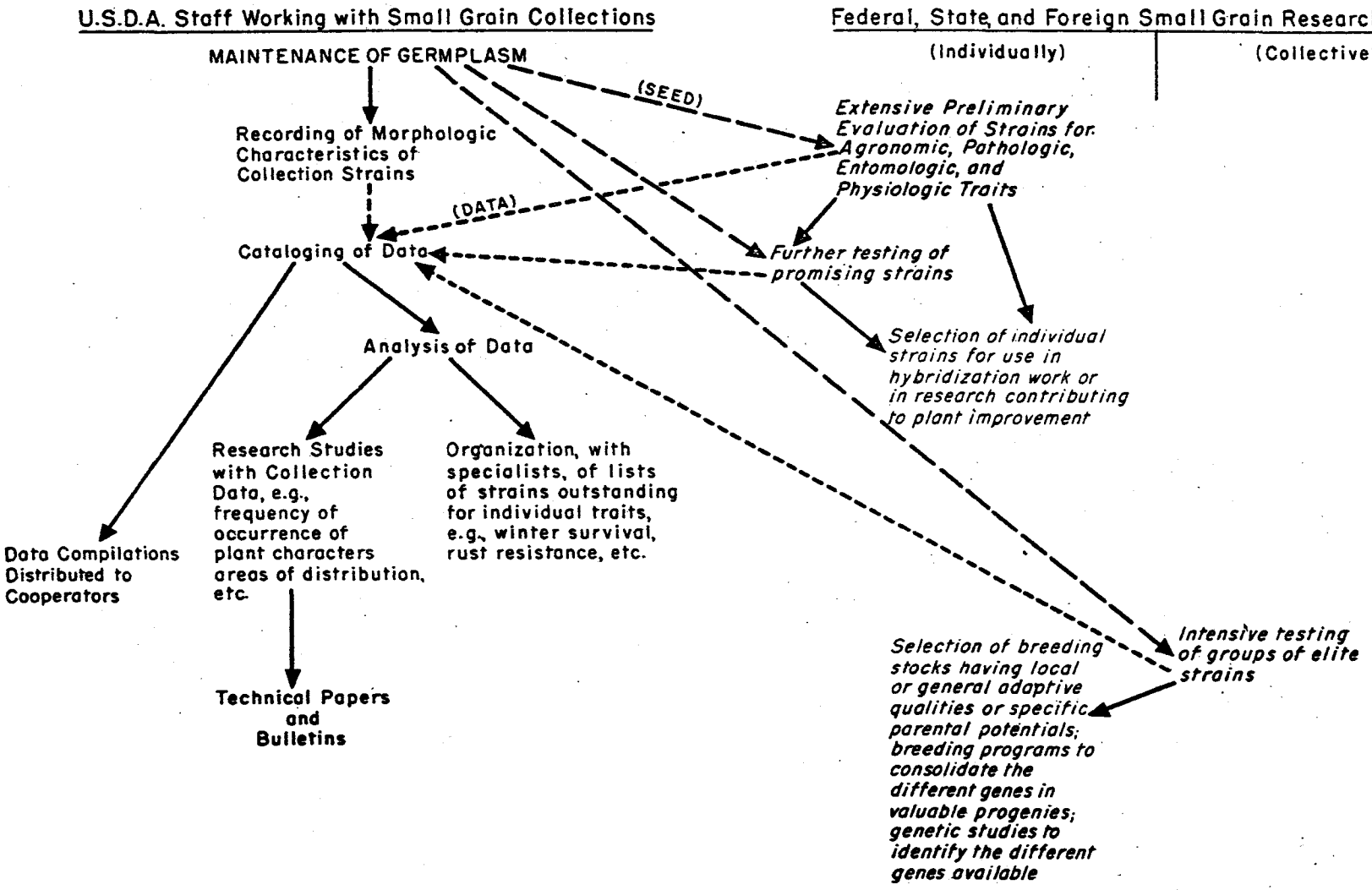
UNITED STATES PROGRAM FOR THE MAINTENANCE AND EVALUATION OF WORLD SMALL GRAIN GERMPLASM



Reaction of Entries in the 1956 Uniform Oat Disease Nurseries

by H. C. Murphy (USDA)

The diploid Saia was the most resistant to crown rust at all locations of 42 entries in the 1956 Uniform Oat Rust Nursery, with an average infection coefficient of 0.3 percent. Among the hexaploid varieties, Landhafer and Ascencao almost equal to Saia for outstanding resistance with average infection coefficients of 0.5 percent. Bondvic and the Landhafer derivatives: C.I. Nos. 6998, 7149, 6878 and 7152, Clintland, and C.I. Nos. 6936, 7083, 7148, 7136, 7153 and 7150 were also highly resistant, with average infection coefficients ranging from 0.8 to 2.8 percent, respectively. The most susceptible entries were Markton, Richland and Minrus, with average infection coefficients of 44, 38 and 24 percent, respectively. There was no indication of race or races of crown rust being present to which Landhafer, and derivatives possessing the Landhafer resistance, were susceptible. It is disturbing, however, that 11 of the 24 new varieties and selections in the nursery were Landhafer derivatives. Because of the outstanding resistance afforded by the Landhafer gene, there may be a tendency to again "place too many eggs in one basket." Other sources of almost equally good resistance (but not so genetically simple) are Bondvic, Trispernia and possibly Ascencao and Ukraine.

Putnam, C.I. 7198 and Navarro were free of smut infection at 11 locations, among 40 entries included in a Uniform North Central Smut Nursery grown at 11 North Central states in 1956. Saia and C.I. 6939 showed only a trace of infection at single locations, and the average infection for Minhafer, Burnett, Logan and Markton was only 0.1 percent. Twenty-five of the entries had average infection coefficients below 1 percent, and 32 entries were below 3 percent. Anthony, Gothland, Victory, C.I. 7205, Black Diamond and Monarch were the most susceptible, with average infection coefficients ranging from 57 to 11 percent, respectively.

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Percent of Oats Hulled Affects Yield Data

Ivan Bespalov, Eastern States Farmers' Exchange
West Springfield, Mass.

In the fall of 1956 samples of oat seed were obtained from stations in this area for determining groat percentages by hand hulling the grain. On receiving the samples examination disclosed considerable machine-hulled seed in some seed lots. Further examination disclosed seed from some stations contained more machine-hulled seed than that from others and also there was considerable difference between the amount of hulling in different varieties.

As a consequence, the percent of machine-hulled seed in each sample received was determined and the data obtained are presented herewith. The amount of machine hulled seed, as disclosed by the data presented, was surprisingly great in some cases.

This prompted our calculating the possible errors in yield data where so much of the seed is hulled in the threshing process. Using a 60 bushel yield of oats of about ordinary plumpness; 30 percent hull and 70 percent groat, we calculated the following:

Yield of threshed grain	Hulled kernels in sample	Corrected yield (Approx.)
Bu.	%	Bu.
60	5.0	61.25
60	10.0	62.50
60	20.0	65.00
60	30.0	67.50
60	40.0	70.00
60	50.0	72.50

At Burlington, Vermont, 70 percent of the seed of Burnett was found to be hulled. The yield for Burnett as reported by Burlington was 86.4 bushels per acre. Making corrections as per the above system, then the yield of Burnett should have been at least 103.9 bushels per acre. That difference would have been sufficient to raise Burnett's rank, as to yield in their test, from twelfth to first, certainly a considerable difference.

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Percent of Machine-hulled Kernels in 5 gram Samples of Entries in the Northeastern Uniform Oat Nursery in 1956[1]

Entry No.		C.I. No.	Pres. Isle Maine	Orono Maine	Burl. Vermont	Ithaca N.Y.	Univ. Park Penna.	New Brunswick N.J.	Feeding Hills Mass.	Beltsville Maryland
1	Craig	5332	7	5	14	6	7	3	1	0
2	Beede	6752	14	6	14	5	6	4	1	0
3	Forward x (Vict. - Richland)	6938	25	6	5	2	2	0	1	0
4	Forwic x (Hawkeye-Vict.)	7212	24	9	10	8	10	7	1	0
5	Burnett	6537	18	16	70	8	11	2	2	0
6	Clinton 59	4259	24	22	22	7	11	5	1	0
7	Sauk	5946	14	4	7	5	8	2	1	0
8	Mo. 0-205	4988	23	10	9	5	4	2	0	0
9	Jackson	5441	24	10	5	8	5	3	0	0
10	Clarion	5647	23	4	10	9	7	11	1	0
11	(B-R-H-J) x Landhafer	6913	37	8	8	8	15	3	1	0
12	Landhafer x (Mindo-H-J)xClinton	6935	10	27	3	10	2	2	0	0
13	Clinton x (Boone-Cartier)	6641	40	15	23	10	4	4	2	0
14	" (")	6933	20	20	19	8	7	9	2	0
15	Garry	6662	24	8	2	9	3	8	2	0
16	Tama	3502	11	4	14	1	1	0	1	0
17	Victory	560	28	8	3	4	1	3	3	0
18	Ajax	4157	29	5	6	7	3	1	2	0
19	Ajax x (Hawk.-Vict.)	7213	8	7	14	6	4	4	1	0
20	Simcoe	6767	12	6	15	2	2	3	0	0
21	Rodney	6661	14	12	20	7	3	8	5	0
22	G. A. 52	7202	24	12	18	6	8	2	3	0
23	Scotian	7203	9	11	8	4	3	1	3	0
24	(Roxt.xRL1276)(AjaxxRL1276)	7209	9	5	4	5	3	2	1	0
25	Goldvin x Clinton	6940	10	2	6	3	0	2	0	0
26	" x Boone	7210	7	2	7	2	2	0	1	0
27	" x C. I. 4192	7211	11	12	9	2	4	3	3	0
28	Mohawk	4327	17	15	21	3	8	2	2	0

[1] Percents listed are on basis of seed samples cleaned by use of Dakota blower.

Entry No.		C.I. No.	Pres. Isle Maine	Orono Maine	Burl. Vermont	Ithaca N.Y.	Univ. Park Penna.	New Brunswick N.J.	Feeding Hills Mass.	Beltsville Maryland
29	Roxton	4134	28	7	14	12	4	8	16	0
30	(Roxt.(Vict-H-J))(Ajax(Vict-H-J))	5961	15	15	17	4	5	1	2	0
31	" x "	5962	12	16	28	5	4	5	5	0
32	" x ""	5964	15	7	27	10	10	6	2	0

Excessive Hulling of Oats by Nursery Threshers

by F. A. Coffman and Clemmer Marcus[1]

In the fall of 1956 the writers requested seed samples of the entries in the 3 fall and 2 spring oat nurseries that are outlined at Beltsville, for making groat determinations. The oat huller used was assigned to the Plant Industry Station by Dallas Western in behalf of Quaker Oats Company. On starting hulling operations it was noted that some threshed samples already contained a considerable percentage of naked groats. The seriousness of the situation was further realized when a letter about that time received from E. K. Walrath, Eastern States Farmers' Cooperative, West Springfield, Mass., reported that the samples they had received from different stations also showed considerable hulling.

Thereafter the percent of thresher-hulled seed in each sample was determined before making any hull determinations. This proved to be laborious. The percentage of machine-hulled seed in each sample of three varieties, Clinton, Mo. 0-205, and Burnett, was determined as a measure of the prevalence of hulling. The data on these are presented herewith.

Percents of machine-hulled kernels in samples of 3 oat varieties from 16 experiment stations in 1956

Northeast	Clinton "59"	Mo. 0-205	Burnett
Maine			
Orono	12.50	5.5	10.00
Presque Isle	14.0	21.00	21.00
Maryland			
Beltsville	0.00	0.00	0.00
Massachusetts			
Feeding Hills	0.00	0.00	7.50
New Jersey			
New Brunswick	2.75	1.00	2.00
New York			
Ithaca	4.75	2.50	8.00
Pennsylvania			
University Park	11.25	2.00	16.00
Vermont			
Burlington	14.50	--	27.00

[1]Agronomist and Agricultural Aid, FCRB, ARS, U. S. Department of Agriculture

Northeast	Clinton "59"	Mo. 0-205	Burnett
W. Virginia			
Morgantown	6.00	0.00	3.50
Illinois			
Urbana	0.00	0.00	
Kansas			
Manhattan	2.50	1.00	
Hays	2.00	7.50	
Kentucky			
Lexington	25.20	13.00	
Nebraska			
Lincoln	1.50	0.00	
Ohio			
Columbus	0.00	0.00	
Oklahoma			
Stillwater	17.20	6.40	

These data reveal a disturbing situation. They suggest the possibility of improvement in the operation of nursery threshing equipment and cast doubts upon the accuracy of some of the yields and test weights that have been reported. The companion paper by Ivan Bespalov reveals the influence of hulling on yield and the table below shows the influence of different percentages of machine hulled grain on test weight. The results obtained indicate that possibly some superior oat selections have been discarded because they hulled so easily in threshing that the yields recorded were below their proper rank. From data assembled it is clear that oat breeders should give careful attention to the threshing of nursery rows.

Effect of percentage of hulled kernels on test weight of oats

Test Wt. Unhulled Kernels	Groats	Test Weight of Samples Containing Indicated Percentages Hulled Kernels				
		5	10	15	20	25
Lbs.	%	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
24	67.5	24.9	25.8	26.7	27.6	28.5
26	64.3	26.7	27.4	28.1	28.8	29.5
28	64.7	28.7	29.4	30.1	30.8	31.5
30	66.5	30.5	31.0	31.5	32.0	32.5
32	74.6	32.8	33.6	34.4	35.2	36.0
34	75.2	34.8	35.6	36.4	37.2	38.0
40	73.4	40.5	41.0	41.5	42.0	42.5

William Carlyle Etheridge (1885-1956)
by T. R. Stanton

Dr. William Carlyle Etheridge, formerly Professor of Agronomy and retired Chairman of the Field Crops Department, College of Agriculture, University of Missouri, died on January 7, 1956 in the Boone County Hospital, Columbia, Missouri, from a heart attack suffered the previous day.

Dr. Etheridge was born at Manteo, North Carolina, June 30, 1885 and received the B.S. degree from North Carolina State College in 1906; and from Cornell University the M.S. degree in 1912; and the Ph.D. degree in 1915. He was an Assistant Agronomist at the Agricultural Experiment Station of North Carolina State College, 1906-1908; an Associate Agronomist in the same institution, 1908-1911; Assistant in Farm Crops, Cornell University, 1911-1915; Professor Agronomy, College of Agriculture, University of Florida, 1915-1916; and Professor Field Crops, College of Agriculture, University of Missouri, 1916-1955.

Aside from his outstanding accomplishments in the development of new crops and new crop varieties for Missouri and adjoining states and his nearly 40 years of research and teaching which brought him national recognition, this brief item is written primarily to give credit to him for his brilliant work on the classification of oats while a graduate student at Cornell University, the results of which were published in 1916 as Cornell Memoir No. 10, entitled "A Classification of the Varieties of Cultivated Oats," which constituted the first comprehensive report of this nature to appear in the United States. It antidated similar publications in both wheat and barley.

He studied 731 collections of oats and described 55 varieties grouped under the three species, or subspecies, Avena sterilis, A. sativa, and A. sativa orienthalis. Emphasis was placed on the purely botanical characters that made them varieties. Etheridge's work was a most valuable contribution to the botanical knowledge of oat varieties. In addition to this treatise, Dr. Etheridge has written numerous bulletins, circulars and journal articles on crops and related subjects and is the author of a textbook entitled "Field Crops," which has gone through several editions.

He was an active member and a Fellow of the American Society of Agronomy, a member of Alpha Zeta, Gamma Sigma Delta, Phi Kappa Phi, Sigma XI and the Botanical Society of America.

Dr. Etheridge is survived by his second wife, formerly Miss Helen Averitt, who had served as his secretary for many years, three sons and one daughter. His first wife who formerly was Miss Fanny Cassell, died shortly before his retirement. She deserves much credit as an artist for making the line drawings and color plates for Cornell Memoir No. 10.

Dr. Etheridge was a man of marked ability, sterling character, broad vision and a benefactor to mankind. On retiring from his long tenure as Chairman of the Department of Field Crops at the University of Missouri, he was the recipient of

many fine tributes. Among these, the one he cherished the most was a resolution passed by the House of Representatives of the General Assembly of the State of Missouri commending him for his services and contributions to the agriculture of the state and nation.

John Huntington Parker, a Former Oat Breeder Answers the Call of the Grim Reaper
by T. R. Stanton

Dr. John Huntington Parker, Director of the Midwest Barley Improvement Association and a former oat breeder, died in Milwaukee, Wisonsin on October 27, 1956 after a lingering illness from cancer. He was born at St. Paul, Minnesota, August 13, 1891.

Dr. Parker received the B.S. degree from the University of Minnesota in 1913; the M.S. degree from Cornell University in 1916; and the Ph.D. degree (in agriculture) from Cambridge University, England where he was an International Education Board Scholar, 1925 to 1926.

He served as a Scientific Assistant in cereal investigations in the old Bureau of Pland Industry, U. S. Department of Agriculture, from 1913 to 1917. He resigned from this position to become Professor of Crop Improvement at the Kansas State College, Manhattan, where from 1917 to 1939 he demonstrated great ability as a teacher and research worker in crop improvement. He gave up the role of teacher in 1939 to become Director of the Kansas Wheat Improvement Association and in 1945 he was called to the Directorship of the Midwest Barley Improvement Association with headquarters in Milwaukee. While at Kansas State College he also served from 1931 to 1932 as a Visiting Professor in the Department of Plant Breeding at Cornell University.

This item has been written for the 1956 National Oat Newsletter primarily because of his great interest in the breeding of better oats. He played a major part in the development and distribution of the famous Kanota variety as well as being the actual breeder of the Fulton oat. He pioneered in directing sutdies of variation in oats, especially in the notoriously variable Burt variety and likewise made a study of fatuoid, or so-called false wild oats. It also should be stated here that he was one of the first investigators to conduct systematic studies of the relative rust resistance of oat varieties. (see U.S.D.A. Bul. 629)

In all probability, however, his greatest contribution to agriculture and his fellowmen was made as one of the most efficient, highly informed, enthusiastic and inspiring teachers while a professor at Kansas State College from 1917 to 1939 in the training of many young agronomists in the genetics and breeding of wheat, oats, grain sorghum and barley. His great knowledge of the literature on plant genetics, crop breeding and improvement was the marvel of all his students and contemporaries.

After becoming Director of the Midwest Barley Improvement Association in 1945 he became an enthusiastic barley specialist and contributed much toward the development and distribution of superior brewing barley varieties during the last decade.

Dr. Parker was the author or joint author of many bulletins, circulars, and journal articles on various phases of the production, and improvement of the small grains and grain sorghum.

He was a member and Fellow of the American Society of Agronomy, also a member of the Society of Naturalists, American Association for the Advancement of Science, American Genetic Association, and the Association of Brewing Chemistry.

He is survived by his wife, one son and one daughter. His genial personality, outstanding ability and broad interest in the welfare of his fellowmen made him a host of friends, who will mourn his rather untimely passing.

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III. CONTRIBUTIONS FROM CANADA AND OTHER COUNTRIES

Cereal Crops Division, C.E.F.
Ottawa, Canada
by R. A. Derick and F. J. Zillinsky

Growth conditions for oats in Canada in 1956 were above normal across the country but poor harvest weather particularly in the East brought about some loss both in yield and quality. Some crops in the East were never threshed because of wet weather. The total crop however for the whole country has been estimated at 10% above the 1955 production - with the acreage remaining approximately the same.

Rust damage, except in isolated areas, was much less than average in 1956. Crop loss as a result of leaf blotch and black stem caused by Septoria avenae was also lower than in 1955. Ergot was more prevalent in the oat crop than ever before. Red leaf was less noticeable but the appearance of plants which were either completely or partially dwarfed and which in many cases did not produce heads, caused considerable concern. These plants were somewhat similar to the red leaf condition but did not show the red leaf coloration.

Two new oat varieties have been produced by the Canada Department of Agriculture. One of these called Shield, is earlier maturing than Ajax, similar to Garry in rust and smut resistance, has good straw and a medium size, good quality kernel. The seed supply is limited and the distribution will be confined to northern and eastern Ontario and northwestern and western Quebec in 1957.

Another variety called Fundy from a cross Ajax x Abegweit and having the earliness of Ajax with a more attractive kernel, will probably be licensed early in

1957. The initial distribution will be limited to New Brunswick, Nova Scotia and Prince Edward Island.

Garry continued to hold high favour in Ontario, parts of Quebec and in Prince Edward Island. Even though tests show Garry to be somewhat higher yielding than Rodney, many growers in the East, particularly in Ontario, are favouring the latter variety, chiefly because of its short plump kernels.

Increased effort is being made in co-operation with plant pathologists to obtain resistance to Septoria avenae. So far the best apparent resistance is found among the wild diploid species. This along with their rust resistance is responsible for the interest in the possibilities of using these species for improving cultivated varieties. Several derived forms involving diploid and tetraploid species are now being tested for resistance to Septoria. Resistance among derived forms is desirable because they are much more compatible with cultivated oats than the original diploid species.

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Cereal Breeding Laboratory, Winnipeg
by J. N. Welsh

The growing season in Western Canada during 1956 was, on the whole, good. Although the conditions were conducive to rust development, little rust was in evidence, except on some late sown crops. In the hybrid nursery at Winnipeg, however, the artificially induced epidemic of both stem rust and crown rust was very satisfactory.

Lines from the cross (Santa Fe-R.L. 1942) x Garry, which were also mentioned in last year's Newsletter, again yielded well in 1956. They have the Santa Fe resistance to crown rust and the Garry resistance to stem rust and smut. There are early, medium, and late maturing lines, a few of which are equal or superior to Garry in lodging resistance.

A number of lines resistant to 7A of stem rust were selected from Rodney. Of those tested so far, very few approach Rodney in yield. One line was obtained that is as early as Ajax. It has a particularly strong straw, approaches Ajax in yield, but is susceptible to smut. This last characteristic limits its use to breeding material.

A new hulless variety named Vicar was licensed in 1956 and is to be distributed in 1957. This variety was discussed in the 1955 Newsletter under the accession number R.L. 1692.33. It is a selection from this original Garry variety that possesses the same disease resistance as the new Garry. It matures a week later than Garry, has a taller but equally strong straw, high bushel weight, large kernels, and produces high yields in comparison with other hulless varieties, particularly in Manitoba.

These oats will be used mainly as a feed for poultry and young pigs, particularly weanling pigs. Apparently too much hull in the ration of young pigs causes stomach disorders. Another limiting factor in the use of hulless oats is that they are liable to heat in storage unless harvested when thoroughly ripened and stored when well dried.

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Plant Pathology Laboratory, Winnipeg
By G. J. Green and B. Peturson

Oats in Western Canada suffered little damage from rust in 1956. The movement of air-borne spores from the south was smaller and later than for several years. Crown rust pustules were first observed on July 10 (June 13 in 1955) and stem rust was found first on July 11 (June 20 in 1955). Although weather favored rust development, by mid-August most fields had only a trace of stem rust and a crown rust infection of about 5 per cent. A few late fields of susceptible varieties and wild oats had moderate stem rust infections and heavy crown rust infections. The crown rust probably caused losses in these fields.

One of the most important factors influencing the 1956 rust epidemic was the very large acreage of resistant varieties in the rust area (Manitoba and eastern Saskatchewan). In Manitoba 66 per cent of the oat acreage was seeded to Rodney which is resistant to all stem rust races except 7A and most crown rust races. Garry, which is resistant to all stem rust races and most crown rust races, occupied 14 per cent of the acreage. This preponderance of resistant varieties undoubtedly retarted rust development and reduced rust losses in Western Canada this year.

The distribution of oat stem rust races in Canada in 1956 was similar to that of 1955. Race 7 was the predominant race constituting 61.6 per cent of the isolates and race 8 was next in prevalence (11.3 per cent of the isolates). Race 7A, still an uncommon race, increased slightly from 2.7 per cent of the isolates in 1955 to 6.9 per cent in 1956. Most isolates of this race came from Manitoba where Rodney is the predominant variety and most of the Manitoba isolates were collected on Rodney. Other races isolated were 1, 2, 4, 5, 10, 11, 12 and 13.

Isolates from collections of crown rust obtained from Eastern and Western Canada were identified on the basis of rust reactions produced on the ten regular differential hosts, Anthony, Appler, Bond, Landhafer, Santa Fe, Ukraine, Trispernia, Bondvic, Saia, Victoria and two accessory hosts, Garry and Rodney. In all, 36 races and sub-races of crown rust were identified. Six races, 201, 202, 209, 212, 239 and 240 and their sub-races comprised 64.4 per cent of the isolates identified. In 1955, these six races comprised 68.0 per cent of all isolates.

Seven races, 251, 263, 274, 276, 279, 284 and 285 were isolated for the first time in Canada. However, all these seven races have been previously found

in the United States and one of them, race 263, was isolated by Dr. Marr D. Simons, Ames, Iowa, in 1953 from a collection made in Canada. Two of these races, 263 and 276, are of special interest because they can heavily attack all our commercial varieties and the varieties Santa Fe, Landhafer and Trispernia, which have been used extensively in Canada in recent years in breeding for resistance to crown rust. Both these races are quite scarce at present.

Rodney was resistant to 80 per cent and Garry to 73 per cent of the crown rust isolates obtained from the crown rust collections made in Canada in 1956.

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INDIA

Indian Agric. Research Institute, New Delhi, India
by R. S. Vasudeva, Div. Mycology and Plant Pathology

Covered smut of oats (Ustilage killeri Wille) has been reported to be very serious in the Punjab, often resulting in the reduction of grain yield by $\frac{1}{4}$ to $\frac{1}{2}$. In varietal resistance tests conducted in the Punjab during the year 1953-54, oat variety Weston was found to be highly susceptible, whereas Alegerian and Brunker appeared to be resistant. Effective control of the disease was obtained by seed treatment with Ceresan, Tillex and Suprocide.

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

ARIZONA

by Arden D. Day (Tucson)

Oats in Arizona

Oats are grown on a smaller acreage in Arizona than either barley or wheat. They are a very popular winter pasture crop throughout the state because of their ability to continue vegetative growth longer in the spring than either barley or wheat.

Prior to 1956 Arizona farmers grew between 26,000 and 27,000 acres of oats each year. In 1956 the Arizona oat acreage decreased to 25,000 acres.

Forty-four percent of the 1956 oat crop was harvested for grain, and 56 percent was used for winter pasture, green chopped feed, and hay production.

The 1956 production of oat grain in Arizona was 16,896 pounds. The state averaged yield was 1,536 pounds per acre.

The principal varieties of oats grown in Arizona in 1956 for grain production were Palestine, California Red, and Markton. The most popular oat variety for winter pasture, green chopped feed, and hay was Markton.

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ARKANSAS

by H. R. Rosen and R. L. Thurman (Fayetteville)

Oats

Approximately 729,000 acres of oats were sown and 442,000 acres harvested for grain in Arkansas in 1955-56. The acreage of oats for uses other than grain production is increasing. The 1956 crop produced an average of 42.0 bushels per acre which was 11.3 more than the 10 year average and 6.0 bushels more than the 1955 average. Since the winter of 1955-56 was comparatively mild, there was but little winter injury so that varieties with low winter hardiness were oftan among the top grain yielders.

A line from the Arkwin variety, more uniform than the original release, is being increased with a view of distribution to growers in 1958. Breeder seed are to be available in 1957.

Crown rust, with some localized exceptions, was of minor importance. Stem rust appeared late in the season and did little damage to winter oats. Late planted spring oats were severely injured by this rust. Smut was present in average amount although some widely scattered fields were observed which showed as high as 25 percent.

The most common parasitic disease prevalent throughout the state in the year was Helminthosporium leaf spot, H. avenae. There was little difference in the amounts of leaf spot prevalent on varieties commonly grown. However, some varieties which showed fewer infections up to the milk stage, often showed considerable spotting in later stages. The damage caused by this disease is difficult to evaluate.

Anthracnose was also present but in limited amounts while Septoria was not observed. Virus diseases played a very minor role this year.

Because of the popularity of the large-kerneled Red Rustproof type of oats, particularly in the rice growing areas of the state efforts have been made to breed red oat types with better straw and disease resistance than that possessed by some of the Red Rustproofs. A number of selections from (C.I. 4382 - Bonda) X Landhafer that possess the desired characters have been made. One of these selections, C4-4-5-1 (C.I. 7224) is now being tested in the Uniform Central and Northern Oat Nurseries and throughout Arkansas.

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CALIFORNIA

Coit A. Suneson, Agronomist, FCRB, ARS, U.S.
Department of Agriculture (Davis)

Indio Oats

This Indian type oat, derived from a single F_6 line (Victoria-Richland x Fulghum) x Palestine[5] is being released in California this year. It took 16 years to produce Indio (Spanish for Indian). It has substantially the same appearance, growth, and production in the far southwest as Palestine. This prototype, grown since 1940, has been outstanding for yield as well as for drought and shatter resistance; but it is susceptible to many diseases and has kernels light in test weight. In stem rust epidemics during 1953 and 1954, Indio produced 73 and 54 per cent more than Palestine. Indio has less hull, and weighs about a pound more per bushel than its Palestine parent.

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COLORADO

by T. E. Haus (Ft. Collins)

Due to an extended drought period during the spring growth season, the oat crop in Colorado was very small. An estimated 98,000 acres were harvested, compared with a 10-year average of 180,000 acres. Yield was estimated at approximately 3 million bushels compared with a 10-year average of about $5\frac{1}{2}$ million bushels. The greatest damage of the drought was to the non-irrigated acreage in the eastern portion of the state where an estimated one-third of the seeded acreage was abandoned.

The variety, Park, is being increased by the station to replace Overland as a recommended variety.

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FLORIDA

by W. H. Chapman, H. H. Luke, A. T. Wallace

SEASON 1955-56

Excellent yields were obtained from early entries in the variety trials at Quincy in 1955-56; however, yields of late entries were reduced by dry weather in late April and early May. Dry weather during December and January accompanied by colder than average temperatures resulted in little vegetative growth during this time. Rather warm temperatures during February together with sufficient moisture resulted in abundant forage growth during February and March. Crown and stem rust were of minor importance during the past season.

Forage Studies

Seeding rates of Southland oats were varied from one to four bushels per acre. There was a significant increase in forage production with each additional bushel of seed at planting for each clipping through February 15. There was no significant difference in grain yields from unclipped plots.

One year's results have been obtained on the effect of frequency and height of clipping on forage and grain production of Seminole and Floriland oats. Clipping at two-week intervals produced 37 percent more forage than at one-week intervals; clipping at four-week intervals produced 26 percent more forage than at two-week intervals. These varieties clipped to a three-inch height produced 21 percent more forage than when clipped to a six-inch height. Floriland produced approximately 30 percent more forage than Seminole. When clipping was terminated on February 23, height or frequency did not cause significant differences in grain yields. When clipping was terminated on March 8 or March 22, the method that produced the highest forage yields produced the lowest grain yields.

Diseases in 1956

Southland was severely damaged probably by Helminthosporium avenae. This damage was extensive in commercial plantings from south Florida to the Coastal plains of Georgia. In the breeding nurseries severe damage was specific to Southland and some of its derivatives. The extent of damage to this variety was indicated by a range in yield from 59 to 8 bushels per acre in four replications of a yield test.

For the first time a severe epidemic of powdery mildew (Erysiphe graminis avenae El Marchal) occurred in the breeding nursery. A majority of the selections showed various degrees of susceptibility. Red Rustproof types, Victorgrain 48-93, and a few derivatives of these were highly resistant. Yields of completely susceptible lines were reduced.

Irradiation

Multiple variation in X_3 families of Floriland oats was observed. Preliminary observations of an X_3 family indicated extreme variation in type of growth, height, color and maturity of plants; size, length, width, and shape of panicles; and floret separation; number and development of basal hairs, development of basal scars; and awning of kernels. Resistance to race 7A of stem rust was dominant. Also crown rust susceptible plants were observed.

SEASON 1956-57

Extreme dry weather in northwest Florida resulted in very poor forage production through January 15. The drought was even more severe in central Florida and caused very poor stands. Damage from aphids was widespread and natural infection of crown rust was observed on susceptible varieties. Because of relative warm weather until January 15, oats were very tender. A low temperature of 19° on January 18 caused considerable damage in the breeding nurseries. Commercial plantings that were being grazed were damaged.

Pathologic Variation in Helminthosporium Avenae

A severe epiphytotic of oat leaf blotch occurred in Florida and south Georgia during the spring of 1956 and a number of different symptom manifestations were observed. Sheathes and culms of certain varieties were observed to be severely infected and isolations were made from leaves, sheathes and culms. An isolate from each plant part (leaf, sheath, culm, and culm cavity) was prepared in a conventional manner and used to inoculate the foliage of various varieties. This inoculation technique was carried out by macerating fungal material from liquid cultures in a Waring blendor and spraying this concoction directly on the plant foliage. Plants thus treated were maintained in a moist chamber for approximately 40 hours at which time they were moved to the greenhouse. The degree of pathogenicity of various cultures was judged eight to ten days following inoculation. The scale used in this evaluation ranged from 0 to 5; 0 indicating no sign of infection and 5 representing complete susceptibility; that is, large blotches 10 mm. or longer. Data obtained are found in the following table.

Variety	Isolate Number			
	3	9	10	11
Bl. 47-67	4	1	0	3
Kareela	4	3	0	4
Southland	5	5	3	5
Floriland	4	2	1	5
Sunland	5	3	2	4
Seminole	4	2	0	4
Red Rustproof 14	5	2	0	3
Arlington	3	1	0	2

Each figure represents the average reading from four pots.

When these results were studied several points worthy of note were observed. These points follow: (1) The overall reaction of all varieties to isolates tested indicated that Arlington and Bl. 47-67 were the most resistant while Southland and Kareela proved to be the most susceptible. (2) Certain cultures exhibited a tendency toward physiologic specialization, i.e., isolate 10 was pathogenic on Southland and Sunland but did not attack other varieties; moreover, isolate 9 did not severely attack Bl. 47-67 while isolate 3 incited a susceptible reaction on this variety. (3) Symptoms expressed by Southland inoculated with isolates 3 and 10 were distinctly different thus indicating the occurrence of symptomatological strains of H. avenae.

Selection Among F_2 Plants for their Forage Production

Considerable data have been accumulated by small grain workers to indicate that selection among spaced plants of small grains for grain yield is ineffective. The reason for this is that heritability values for grain yield are quite low. To determine if selection among F_2 spaced plants for forage production was effective the spaced F_2 plants from two different crosses were selected for high forage production, low forage production and at random. The basis for ranking the plants was observational. There were 58 selections in each class. The seed from the selected plants were increased and the progeny tested in a clipping experiment with two replications. The results are presented in the following table as mean yield of green forage in pounds per acre.

Selection System		1st Clipping	2nd Clipping	Sum of 5 Clippings
Selected for low forage	Cross A	2912	4868	24,656
	Cross B	2997	4832	25,756
	Average	2955*	4850	25,206
Selected for high forage	Cross A	3260	4798	24,408
	Cross B	3254	4618	24,117
	Average	3257	4978	24,263
Selected at random	Cross A	3242	5200	25,545
	Cross B	3234	5024	26,458
	Average	3238	5112	26,001

*Significantly lower than the other two selection systems at this clipping only. The other average yields are not significantly different.

These results indicate that with forage production in oats, as has been found by many workers for grain production, the environmental portions of the plant-to-plant variance among spaced plants is quite large. Furthermore, they indicate that for selection to be effective among F_2 spaced plants for forage production more accurate measurements will have to be made on the F_2 plants than were made in this experiment.

Evaluating Oats for Grain Yields

One wonders at how many locations and for how many years should a variety be tested before confidence can be placed in its production record. To obtain an estimate of the year-to-year variation and location-to-location variation and also a year-by-location interaction, yields of seven varieties of oats grown at five locations in Florida for three years were analyzed. The analysis is presented in the following table.

Source of Variation	d.f.	Mean Square
Total	419	
Locations	4	
Years	2	
L. x Y.	8	
Reps. in L. and Y.	45	
Varieties	6	1607.15
Var. x Loc.	24	460.46
Var. x Years	12	1821.08
Var. x Loc. Years	48	187.08
V. x R. in L. and Y.	270	71.45

The components of variance were identified and are as follows:
Ve = 71.45, Vvyl = 28.91, Vvy = 817.00, V_{vl} = 22.78, and V_v = 0.
It was rather disconcerting to find out that the variance component for varieties was equal to zero. This indicates that not one of the varieties was best at all locations for all three years. The largest component is the variety by year interaction. This large component indicates that the varieties should be tested over a longer period of time. In two of the three years the climate was very similar. The data from these two years were analyzed and the components are as follows: V_e = 88.04, V_{vyl} = 7.36, V_{vy} = 0, V_{vl} = 19.95, and V_v = 59.15. The fact that the variety by year interaction component from this analysis is zero indicates that all varieties need to be tested long enough to sample the years in which they are to be grown before much confidence can be placed in the yield data.

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GEORGIA

By A. R. Brown (Athens)

There were 433,000 acres of oats harvested for grain in Georgia during 1956. Oats grown for grazing only totaled over 400,000 acres. The average yield per acre for the state was 33 bushels. Dry weather conditions during maturation and harvest resulted bright grain which was high in weight per bushel. Very few farmer's samples were weather damaged to the extent that they graded No. 3 because of being "slightly weathered."

Grain yields of the entries in the 1955-56 U.S.D.A. Uniform Central Area Winter Oat Experiment ranged from 126 bushels for Mustang to a low of 73 bushels for C.I. 7137.

The 1956-57 oat nursery was planted on October 27 and came up to a good stand. Ample moisture and above normal temperatures during December and early January has resulted in rank growth among the oats with a spring-habit of growth. From December 4 to December 23 the record for high temperature was broken on three different days. Low temperatures of 18° to 20°F on January 18 and 19 caused considerable leaf injury on all entries in the U.S.D.A. Central Area Oat Experiment except Forkedeer, LeConte, C.I. 6571 and C.I. 6517.

Dr. Julian Miller and the author found considerable crown rust and Helminthosporium avenae on volunteer oats in mid-December. Thus if mild weather and ample moisture continues, North Georgia might experience considerable damage to the oat crop because of crown rust. During the past seven years, crown rust has come in so late that it has not been of any consequence.

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By U. R. Gore, E. S. Luttrell, and L. L. Farrar (Experiment)

The oat crop in Georgia in 1956 was excellent, with high yields and test weight except in lower coastal plain. There is a good demand for oats as feed for laying hens. The acreage planted in winter grazing is increasing and profitable beef cattle gains are being made. Helminthosporium victoriae is causing considerable loss in stands of forage oats and seems to be in the increase. Most of the oat acreage is in susceptible varieties. Race 216 of crown rust has been picked up on early planted oats, but rust has not caused too muchreduction in yield.

Because of the expanding use of oats for winter grazing or dual purpose, plantings are being made far in advance of the normal planting dates in an attempt to obtain fall grazing as early as possible. Consequently, tests were begun in 1955 to determine the effect of seed quality, seed treatment, and planting date on stands and yields of oats. Two lots of Victorgrain 48-93 oat seed, one lot of poor seed heavily infested with Helminthosporium victoriae and one lot of good, clean seed, were treated with Ceresan M and Panogen andplanted on four dates ranging from

September 1 to October 24. Progressively poorer stands were obtained with earlier planting dates. Treatment had only slight effect on the good seed. Treatment of the poor seed increased stands 77 per cent in the first seeding and to a lesser extent in later plantings, but treated poor seed was consistently inferior to untreated clean seed. All plots were clipped for forage until March 1 and then allowed to produce grain. Seed treatment of the good seed had little effect on forage yields. In the earliest planting, treatment of poor seed increased total production in pounds of dry forage per acre from 1060 pounds for untreated seed to 1720 pounds for treated seed as compared with 2110 pounds for untreated good seed. Treatment of poor seed gave lesser increases in subsequent plantings except for the final planting in which there was a considerable, unexplained increase from seed treatment. Grain yields from all treatments were roughly equivalent except for much lower yields from untreated poor seed in the earliest planting. In this planting treatment of poor seed nearly doubled grain yields.

Dr. Luther L. Farrar joined the Staff of the Plant Pathology Department of the Georgia Experiment Station on July 15, 1956, to assume primary responsibility for disease investigations on small grains. In addition to assisting on work in progress he will attempt to determine the importance of nematodes in small grain production and will expand the work on oat smut, including a study of races present in Georgia.

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

Oats started off well in the Coastal Plain area and considerable early grazing was practiced this season. Rainfall has since been below normal and oats have suffered from dry weather and moderate to severe aphid infestation. So far the weather has not been cold enough to damage oats; December being one of the warmest months since 1933.

Both crown and stem rust were found in fields in late October and early November in several South Georgia counties. Preliminary tests indicate that race 7 of stem rust and probably race 216 of crown rust now prevalent here. There has been no general outbreak of rust up to this time (late January) because of dry weather. However, if warm, rainy weather should prevail during early spring there is a good chance that this could be a "rust year" in south Georgia.

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IDAHO

Frank Petr and Harland Stevens (Aberdeen)

The yields of oats produced in plot tests at Aberdeen in 1956 were considerably above those of recent years. Very little disease and insect damage was observed and only slight amounts of lodging occurred in any varieties. Five varieties, namely Libertas, Centore, Marne, Weibulls 10064, and Binder, produced average yields in excess of 200 bushels per acre. The adapted varieties such as Victory and C.I. 5345 were heavier than normal and weighed in excess of 40 pounds per bushel. The three North Central oats, namely C.I. 6933, C.I. 6934, and Shelby, were among the five heaviest.

In a yield and tillering test Palestine, an early low-yielding variety, produced the greatest number of tillers. There was not a high correlation between number of tillers and yield even though Cody, which was second in tillers was one of the high yielders.

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by K. H. Klages, (Moscow)

At the main station at Moscow, we had this year an outstanding yield nursery consisting of 32 varieties. Climatic conditions were extremely favorable for oat production. This was indicated by the range of yields which varied from 153 bushels per acre at the highest to 105 bushels per acre for the lowest yielding variety.

We are now engaged in determining the hulling percentages of the varieties and hybrids included in the yield nursery.

In this state the newest variety of oats released is Cody resulting from the cross (Victoria x Richland) x Bannock. This variety will be used on our dryland oat producing areas in the eastern part of the state.

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ILLINOIS

C. M. Brown and R. M. Endo

An average yield of 46 bushels of oats per acre was produced in Illinois in 1956. This is 10 bushels lower than the record crop of 1955 but is approximately 6 bushels higher than the 1945-54 average yield. The oat acreage in 1956 was 3,041,000 acres, which is approximately 150,000 acres lower than that reported in

1955. Clinton continued to occupy more acres than any other variety, however, its acreage dropped from 47 percent of the total in 1955 to 39 percent in 1956. The popularity of Clinton has shown a significant decline since 1952 when it occupied almost 80 percent of the acreage. Of the total acreage of oats harvested in Illinois, Clinton accounted for 39 percent, Nemaha 23 percent, Clintland 12 percent, Columbia 5 percent and Mo. 0-205 and Clarion 4 percent each. Other varieties listed among the top ten are Bonham, Bonda, Branch, and Benton. A considerable portion of the acreage of Clinton was apparently replaced by Clintland as the acreage of Clintland increased from 3 percent in 1955 to 12 percent in 1956. It is interesting to note that the acreage of Mo. 0-205 dropped from 7 percent in 1955 to 4 percent in 1956. This drop was apparently due to the failure of this variety to gain the favor of the milling industry.

Oat Diseases

Race 202 of crown rust and stem rust race 7 were prevalent in spring oat fields in northern Illinois and undoubtedly caused some reduction in yield. The two diseases appeared too late to cause appreciable damage elsewhere in the state. Crown rust race 202 was responsible for yield reductions in northern Illinois of about seven bushels per acre. This was the average difference in yield obtained for the crown rust-resistant Clintland and the crown rust-susceptible Clinton in varietal yield trials conducted by the Agronomy Department, University of Illinois. The two varieties yielded approximately the same in central and southern Illinois.

Yellow dwarf of oats (red leaf) appeared only in trace amounts throughout the state, but an occasional field was found to be seriously damaged. As in 1955, the Septoria disease of oats appeared to be one of the more prevalent diseases of spring oats in central and northern Illinois. In many fields in northern Illinois, blackstem lesions were very common and undoubtedly caused some damage. However, lodging due to Septoria was not observed.

New Varieties Certified

A small acreage of foundation seed of the new variety Fayette, which was developed and released by the Wisconsin Agricultural Experiment Station was grown in Illinois in 1956. Approximately 2,000 bushels of this variety will be distributed to Illinois certified seed growers for growing in 1957. Because of its earliness, rust resistance and short straw, this variety appears to have some promise especially in central and southern Illinois. Its yields have been higher than most other early varieties tested in Illinois thus far. The late variety, Garry, has also been approved for certification in Illinois. Because of its lateness, this variety is being recommended only for the northern 1/3 of Illinois. Garry has shown better standing ability and rust resistance than other late varieties recommended in Illinois, but its test weight has been disappointingly low. Its yield has been approximately equal to Sauk.

Newton and Logan were grown on a rather large scale by certified seed growers in 1956. Growers were generally well pleased with their performance. Newton will likely increase rapidly in acreage because of its superior standing ability, high test weight and plump kernels. It will probably replace much of the Nemaha acreage in northern Illinois in the next few years.

Some of the older varieties that continue to make a good showing in Illinois are Clarion, Clintland and Waubay. Nemaha continues to increase in popularity, even though its yields have been considerably lower than most other varieties. Its popularity appears to be based on its early maturity, high test weight, and large attractive kernels. Sauk has been one of the best yielders in northern Illinois but probably will not increase greatly in acreage because of the lodging problem experienced by growers in some areas.

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INDIANA

By F. L. Patterson, J. F. Schafer, R. M. Caldwell, L. E. Compton (U.S.D.A.) (Breeding, Pathology, and Genetics), J. E. Newman, R. R. Mulvey (Varietal Testing), and K. E. Beeson (Extension)

The 1956 Season

The 1956 spring oat growing season was considered a good one but far less ideal than 1955. The bulk of the crop was planted at a near normal date. Temperatures ranged from normal to slightly below through April, May, and the first 7 to 10 days of June. After the first week in June above normal temperatures and less than normal precipitation dominated the weather picture in the northern third of the state. This weather pattern cut the 1956 average Indiana yield considerably below that of 1955 since this is the area of major spring oat production.

The major portion of the winter oat production is confined to the southern one-third of the state. Winter killing was slight in this area and the production level was high.

Oat Disease Notes for 1956

Stem rust was observed to be the most widespread and damaging of any year since detailed observations were initiated in 1930. An overall state yield loss of 1% was estimated. Varietal susceptibility would indicate that the predominant race was race 7. Severity of infection on Clinton 59 and Clintland generally ranged from 10 to 20 per cent. However race 8 or related races were present as indicated by infection of the Newton variety in occasional locations in northern Indiana.

Crown rust infection was generally light in the state. However, some severe epidemics were observed in the eastern part where Clintland remained practically free of infection while its recurrent parent Clinton 59 was heavily infected.

Red leaf (yellow dwarf) was generally present but occurred only in small patches or infected single plants.

Septoria leaf blotch and black stem infection was much lighter than usual in the state and caused no appreciable damage.

Loose and covered smut have almost completely disappeared from the spring oat crop in the state. Smut was found in 1956 only on Forkedeer winter oats in southern Indiana. This elimination has no doubt resulted from the present general practice of growing the resistant varieties recently released and from smut-free and treated seed.

Oat Production in 1956

(Data obtained from Purdue Department of Agr. Statistics in cooperation with U.S.D.A. Agr. Marketing Service, R. E. Straszheim, E. F. Dorman, H. J. Peterson, R. G. Wise, Agr. Statisticians).

In 1956 the acreage of oats remained at about the same level it has maintained for a number of years. The yield was below the record high of 1955 but tied with the previous high, and the total production was second to 1955 among recent years. These figures for the last three years are as follows:

	Acreage		Ave.	
	Seeded (000)	Harvested (000)	Yield Bu./A	Production (000) Bu.
1954	1328	1252	42.5	53,210
1955	1376	1302	51.0	66,402
1956	1327	1250	45.0	56,250

Release of Putnam Oats

About 3000 bushels of Putnam oats were distributed to certified seed growers in Indiana in January 1957. Putnam is a short, very early, stiff-strawed variety distinguished by a deep blue-green color at heading time. It was derived from the cross Boone-Cartier x Clinton. It possesses only a moderate degree of resistance to crown rust and has the "White Tartar" type of resistance to stem rust.

Putnam is recommended for the southern half of Indiana where it has exceeded all other varieties in yield. It is recommended in the remainder of the state where an early oat is preferred.

Putnam has averaged 4 to 5 days earlier than Clintland and 2 to 4 days earlier than Mo. 0-0205 and Columbia.

The back cross program to add additional crown and stem rust resistance to Putnam is well along.

Problem of Nomenclature in the Rust Resistance Backcross Program

One of the objectives in the spring oat program is to bring currently satisfactory resistance to all races of crown and stem rust into the currently superior varieties for Indiana. In this effort the Landhafer crown rust resistance, Hajira stem rust resistance, and either the Richland or linked Richland-White Tartar stem rust resistance is being added, where not already present, to Clintland, Newton, Putnam, C.I. 6933 (Clinton x Boone, Cartier), and C.I. 5962 (Ottawa 3928-5-8). The present state of progress ranges from the third cross for Newton to the 7th for Clintland.

A superficial but very practical problem faced in this program is that of varietal nomenclature in connection with the backcross derivatives of the named varieties. Three possibilities are available: use of the old name unchanged, the old name with an added designation, and assigning of a completely new name. It is felt that use of the old name unchanged would lead to confusion and result in an undesirable situation. At the other extreme the assignment of a new name as done earlier with Clintland and Bentland brings up definite problems. Meaningful combination names such as these are not readily available for these new more complex combinations. It would mean a change of names across a whole series of varieties and partial loss of the grower education already attained in relation to these varieties. Finally, the procedures of release of a new variety in recent years have become a somewhat ponderous proposition, and the use of anew name would necessitate utilization of the full varietal release channels. It is presently felt that the use of the previous name with an added designation along the general pattern used in California would involve the fewest real problems of the various nomenclatural possibilities listed. Support or criticism of this proposal is solicited.

Stiff Straw Derived from Plant Introductions

Several varieties of oats included in the set of plant introductions grown in 1952 appeared interesting in their straw characteristics. Hybrid derivatives of 2 of these have been of continued interest. The more promising of these is the Welsh variety, Milford, P.I. 193101. This is a short oat with a compact panicle and relatively stiff straw but which is not productive under Indiana conditions. Milford has been crossed with several of the stiffer strawed Purdue lines, and a number of the selections derived from these crosses appeared promising for straw strength in 1955 and 1956. The best standing lines of this material in the 1956 nursery were included among F_3 selections obtained from the 3-way cross. (Milford x Selection of Clinton^2 - Arkansas 674) x Clintland. A number of the better lines

will be included in preliminary yield tests in 1957, and several have been brought into further crosses.

The other introduction of interest is an unnamed selection from Scotland, P.I. 193027. This is a dwarf line which is extremely unproductive and shows considerable sterility under Indiana conditions. The original line has been difficult to propagate. The F_1 and later generation heterozygous plants obtained from crosses with this variety are outstanding in appearance, but the homozygous selections obtained so far are dwarfed, partially sterile, and have very compact brittle panicles, although they are extremely stiff-strawed. P.I. 193027 has been crossed and backcrossed 5 times to Clintland without separating the adverse panicle and fertility characteristics from the very short, stiff straw. The Clintland derivatives are very extreme in their dwarfness although more productive than the original parent. Somewhat superior lines have been obtained from crosses with C.I. 5962 (Ottawa 3928-5-8). Currently, this material has been crossed with the tallest, largest panicled oats available in an effort to determine how much the unfavorable aspects may be modified.

Forage Yield of Oats

Seven varieties and lines of oats were seeded at 3 rates in nursery plots in 1956 to determine forage yields. Plots were harvested at the silage stage (early dough) by hand and oven-dry weights obtained. The analysis of variance indicated a high yielding group made up of Bentland, Newton, Ottawa 3928-5-8 C.I. 5962, and Purdue 422A1-59-1-6 C.I. 6933 and a low yielding group consisting of Putnam, Clintland and Mo. 0-205. Varietal differences within groups were not significant. The high group averaged 7,640 pounds of oven-dry material per acre and the low group 6,000 pounds. The differences between the lowest and the highest rate of seeding were significant with the lowest seeding rate giving the highest forage yields. Rate of seeding was much less important than variety.

The approximate grain yield level estimated from an adjacent test for the same varieties was 89 to 120 bu/A. at a normal seeding rate.

Varietal Mixtures

Seven varieties were grown alone and in all possible combinations as 50-50 mixtures, on the basis of number of seeds, for studies of yield and straw strength. Varieties varied in height and in maturity. Severe lodging of all plots prevented critical straw comparisons. None of the 15 variety mixtures yielded significantly differently from the mean of the component varieties at a yield range of 89 to 120 bushels per acre and an L.S.D. at the 5% level of 6.4 bu/A.

Overstate Varietal Performance Tests

Putnam was the highest yielding variety for southern Indiana as it was the previous 3 seasons. Two unnamed selections from the same cross as Newton were outstanding in tests throughout the state.

A report on the performance data for 1950-56 has been combined with the Purdue small grain varietal recommendations for 1957 in a Purdue University A.E.S. Bulletin, now in press

Oat Varieties Recommended for Indiana, 1957

The Purdue Experiment Station Small Grain Improvement Committee has continued its annual practice of recommending oat varieties for seeding in Indiana. The 1957 bulletin, now in press, recommends Clintland and Bentland for the northern half of Indiana, Newtown for the northern three-quarters of the state, and Mo. 0-205 for the southern half. Newton, Clintland and Bentland are considered acceptable in the area where not recommended (southern Indiana) and Clinton 59 is acceptable for the whole state.

Dubois winter oat is recommended for the southern one-quarter of Indiana.

Oat Varieties Certified in Indiana, 1956

All varieties recommended or considered acceptable by the Small Grain Improvement Committee are eligible for certification in Indiana. The acreage inspected for certification in 1956 was as follows:

	Foundation acres	Registered acres	Certified acres
Newton		4067	
Bentland		2252	
Clintland	25	534	3539
Clinton 59	6		182
Mo. 0-205		10	7
Clintafe			8
Dubois (winter)	16	209	127

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IOWA

by J. A. Browning, K. J. Frey, F. P. Gardner, H. C. Murphy, K. Sadanaga, M. D. Simons, S. C. Wiggans, R. E. Atkins, T. Horner, J. E. Sass (Ames)

Mutation Breeding

Radiated and non-radiated families of Mo. 0-205 and Simcoe varieties were grown in a yield test in 1956 to evaluate mutations for quantitative characters. The intra-family (a family represents the lines derived from one X_1 seed) variances for yield were as follows:

	Radiated	Non-radiated	Ratio: $\frac{R}{N}$
Mo. 0-205	368	152	2.4
Simcoe	283	34	8.3

Although most of the variation in the radiated families was caused by lines with reduced yields, a number were found which yielded significantly higher than the mean of the checks. Wide variation was also found for test weight.

These data are especially interesting because the lines tested in radiated and non-radiated families were selected, insofar as possible, to represent the visual prototype of the parental variety. Each experiment looked like a uniform planting of the parental variety.

Straw Strength

The World Oat Collection, consisting of 5471 entries, was tested for straw strength at Aberdeen, Idaho, in 1955. One hundred diverse entries, outstanding for straw strength (including some weak-strawed checks) were grown in a replicated nursery at Aberdeen in 1956 and evaluated for straw strength using the snap (tension) test, chain measurement (Clr), and percentage of lodging (following irrigation under windy conditions). The ten most strong strawed diverse entries were:

1. C. I. 5155	Aa 708
2. C. I. 5154	Aa 676
3. P. I. 193447	Craigs after lea
4. P. I. 193027	Scotland
5. C. I. 5545	Appler x Clinton^2 - Santa Fe
6. C. I. 4893	Milford, S 225
7. C. D. 3932-16	Beacon x Laurel
8. C. I. 6815	Santa Fe x Clinton
9. C. I. 5156	Aa 712
10. C. I. 5440	Waubay

Ten oat crosses were measured for Clr reading in the F_2 and F_3 generations. Readings were made upon one culm on each F_2 plant and on 3 culms in each F_3 head row. The correlations between the F_2 and F_3 generations were as follows:

Cross	Correlation
P. I. 185785 x Minor	0.24*
Minor x Clintland	0.15
Marion x Mo. 0-205	0.29**
Garry Sel. x Clintland	0.04
Mo. 0-205 x Clintland	0.11
P.I. 185785 x Minor^2	0.21
Mo. 0-205 x Minor	0.24**
Garry Sel x Minor	0.13
Craigs - afterlea x Minor	0.21*
Craigs - afterlea x Garry Sel.	0.39**

Irrigation of Oats Planted in Mid-Summer

In central Iowa, oats are ordinarily planted early in April and harvested late in June or early in July. In terms of breeding and disease investigations, this means that all field work must be carried out in a very short period of time, and data for only a single growing season can be obtained in one year. The advantages of obtaining certain kinds of data for two generations of oats in one year are obvious, but it is generally thought that the last half of the summer in this area is too hot and dry to grow oats either experimentally or commercially. However, if adequate water for growth of oats and development of diseases could be supplied by artificial irrigation, growing two crops of experimental oats each year might be feasible. In order to test this possibility, a planting of oats was made at Ames in late July, 1956. The material planted included yield and fungicide tests, the crown rust differential varieties, a crossing block, and several F_2 populations. Spreader rows of Markton oats were planted and inoculated with a common race of crown rust as is done in the spring. These late-planted, irrigated oats emerged and grew very rapidly as compared with their development when planted in early spring. Crown rust spread very well from the spreader rows and stem rust, which came in naturally, also developed heavily. In combination, the two rusts were sufficiently severe to kill plants of the susceptible variety Markton prior to heading. It was concluded that with that aid of irrigation satisfactory disease data could be obtained from oats planted in mid-summer in Iowa.

Oats for Forage

During the past year studies have been conducted on the value of oats for silage. Four varieties, Andrew, Garry, Mo. 0-205, and Newton were cut at the boot, heading, milk, soft dough, hard dough, and grain stages of growth. Dry matter yield increased with successive harvesting periods, but the rate of increase diminished after the milk stage. Although the nitrogen percentage was reduced with increasing maturity the total nitrogen yield remained fairly constant. The oat

plants had absorbed most of the nitrogen by the boot stage.

In another experiment Clintland and Mo. 0-205 were clipped at various stages of growth to determine the effect of clipping on grain and forage yield. Clipping at the 4-leaf stage had no effect on grain yield. Clipping at the 5-leaf stage quadrupled the forage yield but reduced the grain yield by 25 percent. Clipping at the boot stage produced over a ton of forage dry matter per acre but gave almost no grain. All stages of clipping retarted floral initiation and delayed maturity. Nitrogen fertilization had no affect on grain yield under the various clipping treatments but did significantly increase forage yields.

1956 Iowa Oat Diseases

Oat diseases and oat yields were at a near-record low in Iowa in 1956 because of the drought. So severe was the drought that some plots in South, Western and Central Iowa were not harvested and some disease nurseries were abandoned. Yields obtained in experimental plots at outlying farms were at or above the 5-year average only in NE Iowa, for only that section approached normal rainfall. Correspondingly, stem rust, crown rust and Septoria were present only in that section of the state, and that in very small amounts. Losses from diseases for the state as a whole were estimated to be 0.5% each for stem rust, root rots, bacterial blights (most severe in central Iowa that experienced observers have seen), and blue dwarf, and zero to trace severity for other diseases, to total only 2.6% yield reduction due to diseases. Estimated average yield for the state for 1956 was 29.5 bu./A.

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KANSAS

By E. G. Heyne, C. O. Johnston, E. D. Hansing, Manhattan; and W. M. Ross, Fort Hays Branch Station

The oat crop in 1956 was slightly below average. The production totaled 23,177,000 and averaged 21.5 bushels per acre. This actually is a surprisingly good crop in view of the unusually poor conditions under which it developed. There were no major diseases present. Dry weather and high winds were the damaging factors in the 1956 season.

Most of the oat strains tested for smut reaction were resistant except Newton which was highly susceptible to the Victoria race of Smut and Beedee and Fayette which were only intermediate in reaction to this race.

Considerable objection has occurred to yellow oats in Kansas certified Nemaha and Cherokee oats. The Kansas Station will drop Cherokee oats from the recommended list after the 1958 harvest. This will allow certified seed growers of Cherokee time to change to other varieties. The station will concentrate on

improving the purity of Nemaha.

Bulk hybrids of several winter oat crosses received from F. A. Coffman have been grown at Manhattan since 1952. Winter killing has been severe every year but one. The survival in 1956 was remarkable for several crosses especially those involving Hairy Culbertson. One of these bulks, CI 7223, from the cross Hairy Culbertson X NY sel. CI 5364, has been included in the 1956-57 uniform winter hardiness nursery. This should help determine whether growing of bulks outside the normal range of the winter survival area will isolate more hardy types.

Reorganization of breeding projects in Kansas has resulted in giving more emphasis to hybrid sorghums and less to oats. Dr. M. D. Huffman has left the cereal rust work and at present no replacement has been obtained to aid C. O. Johnston on the wheat and oat rust studies.

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MAINE

by Clinton R. Blackmon (Orono)

In 1956 the weather was cooler than normal during most of the season. This resulted in higher grain yields than usual but delayed maturity and caused serious lodging, particularly in Aroostook County.

Summary of Varietal Nurseries

The average yield and test weight of the five highest yielding varieties of oats at Orono and Presque Isle in the Uniform Northeastern Oat Trials during 1956 is as follows:

Entry	Yield bu/acre	Test Weight lb/bushel
Goldwin X CI 4192	103.4	36.3
Improved Garry	101.4	38.1
Goldwin X Boone	96.9	34.3
Ajax	96.5	37.4
Victory	93.8	37.8

In the Maine Experimental Station oat trials at Presque Isle the five leading varieties were as follows:

Entry	Yield bu/acre	Test Weight lb/bushel
Garry selection 6648	125.7	36.0
Trio	119.4	38.2
Branch 5013	117.3	36.9
Craig	115.9	34.9
NY Bulk PO-11	114.9	35.8

Diseases

Helminthosporium Leaf Blotch (H. avenae) was prevalent on varieties grown in Maine this year and very few varieties showed any degree of resistance.

Septoria was of little consequence in Maine during 1956 although it had been damaging in 1955.

Red Leaf virus infection appeared on most varieties at Orono and Presque Isle. The disease appears to be on the increase throughout this area.

Breeding

The World Oat Collection is being screened for high yielding material adapted to Northeast conditions. Some of the varieties in this Collection gave superior yields in comparison to our recommended varieties. In the tests at Presque Isle the highest yielding varieties are compared with Ajax, Clarion, and Clinton "59". See Table 1.

Several very high yielding oat lines have been developed in the oat hybridization program at Maine. Field and regional tests are being planned using the best material from our F_6 and F_7 generations.

A new series of hybrids are being made with the emphasis on crossing highest yielding oats from the World Oat Collection with desirable adapted varieties.

Variety Recommendations

Improved Garry was the highest yielding oat variety in the Maine tests this year but was medium in test weight per bushel. In comparison to other varieties it was equal and often superior in resistance to the prevalent diseases. We are placing this variety on the recommended list.

Table 1

World Oat Collection — Presque Isle 1956

	C.I. no.	Yd bu/A.	Heading Date	Ht. in in	Test wt. bu/A.
White Spring	1419	120.5	7-28	54	36.1
White Swedish	1384	117.9	7-29	54	36.0
White	1125	117.7	7-28	53	36.9
Danish Island	1838	117.2	7-28	51	36.3
Wideawake	1648	117.1	7-29	51	33.6
Silvermine 110-7	1333	116.5	7-28	53	36.0
Victory	1461	114.3	7-30	53	36.3
White Maine	1381	113.3	7-28	54	36.5
Wisc. Ped. No. 1	1306	112.9	7-30	53	34.6
White Oats	1236	112.3	7-27	52	36.3
Silvermine	1546	112.0	7-27	51	36.7
Golden Rule	1166	111.7	7-26	52	37.4
Canada Cluster	999	111.5	7-27	54	36.3
Siberian White	1141	110.8	7-29	53	38.0
Alberta Cluster	1111	110.5	7-28	54	36.3
College Wonder	1024	109.7	7-28	53	37.6
Big Four Saltzer	1173	109.7	7-29	52	34.3
----	751	109.5	7-29	53	35.7
Lincoln	1096	109.0	7-28	54	38.0
Lincoln	1262	108.6	7-28	54	35.4
Ajax	4157	91.9	7-22	47	37.4
Clarion	5647	77.3	7-19	43	37.9
Clinton "59"	4259	80.4	7-19	41	37.9

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MASSACHUSETTS

(See Article by Bespolov p. 21)

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MICHIGAN

by R. L. Kiesling and J. E. Grafius (East Lansing)

The 1956 season got off to a poor start in most areas of southern Michigan. Wet soil conditions delayed both sowing and emergence in many areas of the state. In some areas such as Tuscola county, seeding was timely, emergence fairly rapid and good stands were obtained.

Cool temperatures during July compensated somewhat for late planting so that good yields were obtained at all locations.

Disease resistance studies

Resistance to blackstem of oats from varieties selected from the world collection (Several oat varieties resistant to natural infection by Leptosphaeria avenaria by R. L. Kiesling & J. E. Grafius, Phytopath. 1956) is being combined with both leaf and stem rust resistance.

Anatomical studies are being conducted on the Septoria resistant varieties as compared to susceptible material.

Genotype environment interaction

Studies with particular reference to night temperature and the genotype have been continued. It appears possible to measure the type of season through the use of certain varieties as standards.

Lodging resistance

The lodging resistance factor $clr = \frac{F}{b}$, where F = weight a culm will support and b = height, was investigated further. As was expected, the proportionability constant c is not a universal constant. It differs between crops and between certain varieties within crops such as for 2-row & 6-row barley. This means, for example, that lodging resistance as measured by the clr factor should be estimated within 2 and 6-row varieties and not between, unless the c factor is known.

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MINNESOTA

Minhafer Oats

W. M. Myers, F. K. S. Koo, M. B. Moore, and B. J. Roberts

Minhafer (C.I. 6913), a new oat variety formerly designated as Landhafer x (Bond-Rainbow x Hajira-Joanette) II-47-25, has been released recently by the Minnesota Experiment Station. This variety is resistant to all races of crown rust that are prevalent in North America, all races of stem rust including 7A, and smuts. Minhafer has been tested for five years (1952-56) at various locations in Minnesota

and for three years (1954-56) in the North Central States Uniform Yield Nurseries. On an average it has been superior to Andrew and several other early varieties in yield. It is a yellow oat. Compared with Andrew, it has a higher test weight and larger kernels. It is essentially like Andrew in date of maturity and plant height. However, it is superior to Andrew in lodging resistance.

Crown Rust Resistance Available in Diploid Species

F.K.S. Koo, W. M. Myers, and T. T. Chang

In testing a group of diploid oat species collections to crown rust race 276, two collections of A. brevis, C.I. 1783 and C.I. 2833 were found to be moderately resistant, and nine collections of A. strigosa, C.I. 2524, C.I. 2525, C.I. 2630, C.I. 2835, C.I. 3785, C.I. 3815, C.I. 4746, Ceirch Llwyd, and Saia were either immune or highly resistant. These collections have been intercrossed for allelism studies of the crown rust resistance genes. Crosses of these diploid collections with A. abyssinica (P.I. 193958) are also being made for the same purpose. (Part of the inheritance studies is being carried out by H. Marshall as his thesis problem.)

Differential Responses of Diploid and Hexaploid Oat Species to Irradiation

F. K. S. Koo and W. M. Myers

Saia (A. strigosa, 2n = 14) and Minhafer (2n = 42) have been comparatively studied for their responses to X-ray and thermal neutron treatments as reflected in survival percentage to maturity and mutation frequencies. Results show that diploid species was more susceptible to both X-rays and thermal neutrons than hexaploid species as measured by the survival fraction. On chlorophyll-deficient mutations, rates were higher in diploid than that in hexaploid. The most frequent mutation types in diploid were albinos and light-greens while in hexaploid the predominant types were light-greens and a type that developed an albino section on the second leaf as a result of chlorophyll degeneration.

Cytological Aberrations in Irradiated Oat Progenies

F. K. S. Koo and W. M. Myers

Reciprocal translocations were found in the progenies of both diploid and hexaploid oats irradiated with X-rays and thermal nuetrons. Nine translocation stocks with ring of 4 and one stock with ring of 6 were obtained in Saia, and three translocation stocks with ring of 4 or 6 plus some other aberrations such as nullisomic conditions were found in the irradiated Ajax and Clintafe progenies. In one of the Clintafe M_2's, cells were observed with 20 bivalents plus 1 univalent plus 1 dot-like centric fragment at the first metaphase and anaphase of meiosis. In irradiated Saia progenies, one plant with trisomics associated with nucleolus and the other plant with chain of 3 plus 1 univalent plus 5 bivalents were also obtained.

Variations in Chromosome Number and Pairing in Progenies of a Pentaploid Hybrid of *A. sterilis* x *A. abyssinica*

W. M. Myers and M. Tabata

Comparison of the chromosome number and mode of pairing of the F_3 and F_4 progenies of a pentaploid between *A. sterilis* x *A. abyssinica* was made. The results indicate that the high chromosome numbers (ranging from 43-54) obtained in F_3 plants tended to reduce sharply toward 40-47 range in the F_4 generation accompanied by improved chromosome pairing (in terms of frequency of bivalent formation). The normal or stabilized pairings with 21 bivalents were found only in some F_4 plants of two lines among 10 lines studied. The genome constitution of the newly established hexaploids will be studied.

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MISSISSIPPI

By Donald H. Bowman and Paul G. Rothman (Stoneville)

1956 was an excellent year for oats in Mississippi. The state average of 45 bushels was considerably better than the 10-year average of 31.2 bushels. Total production was approximately twice the 10-year average production. Climatic conditions were generally favorable and no diseases of importance developed in the major oat growing areas.

The 1957 crop generally was planted about the optimum planting time and under favorable moisture conditions. Growth has been good with abundant forage available for livestock. Some frost damage occurred from low temperatures in mid-January but in general prospects are favorable at this time for another good crop.

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MISSOURI

Oat Breeding in Missouri

by J. M. Poehlman, Marvin Whitehead, Dale Sechler, and Charles Hayward (Columbia); Carl Hayward (Pierce City); and Norman Brown (Sikeston).

The 1956 Missouri oat crop was damaged by lack of moisture and by high temperatures during the ripening period. The state average yield was 31.0 bushels, 10 bushels below the 1955 state average of 41.0 bushels. Poorest yields were

obtained in North Central and Northwest Missouri, areas of the state which normally grow the largest acreage of oats. Rust did not cause any measurable loss to oats in 1956.

Mo. 0-206 and Andrew continue to produce excellent yields and are the recommended varieties in Missouri among the new varieties being tested, Burnett has produced excellent yields and is the only variety that has compared favorably with Mo. 0-205. Logan Putnam, and Newton have averaged somewhat below Mo. 0-205.

Breeding work is being concentrated in attempts to improve the lodging resistance and seed quality of Mo. 0-205. The Canadian type of resistance to stem rust is being added by the back cross procedure.

Winter oats are continuing to increase in Southern Missouri where they are used for fall and winter pasture, and to some extent for hay or grass silage in the spring. Dubois and Forkedeer are most widely grown.

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NEBRASKA

By John W. Schmidt, V. A. Johnson, and A. F. Dreier (Lincoln)

The 1956 oat production of 15,588,000 bushels is slightly more than one-fourth of the 10-year average. An estimated 41 percent of the seeded acreage of 2,203,000 acres was abandoned or used for hay and pasture. This is the second smallest oat crop since 1882, only the 1934 crop being smaller. Fair yields were reported from restricted areas in southeastern and western Nebraska. The crop in the northeastern counties was a near failure.

The breeding work was expanded in 1956 to include nursery testing at the Northeast Nebraska Experiment Station near Concord and the planting of the Uniform Spring Sown Red Oat Nursery at North Platte, Nebraska.

Early maturing varieties, generally, have been favored in many years of oat testing in Nebraska. Beginning with 1953, however, the later-maturing varieties have been favored. Andrew and Mo. 0-205 have exhibited good general adaptation for all areas of Nebraska. Newton, in two years of state-wide testing, has shown very specific seasonal adaptation. Its test weight which usually has been good was very poor in 1956.

Jackson, C. I. 5441, was added to the recommended variety list for northeastern Nebraska in 1956. It has had an excellent yield and test weight record in that area. Other varieties under consideration during 1957 will be Burnett C. I. 6537, (Bond-Rainbow x Hajira-Joanette) x Landhafer C. I. 6913, and for the western irrigated areas, Garry C. I. 6662.

New strains that may have promise are Cherokee Reselection C. I. 7194, Nemaha x Neosho-Landhafer C. I. 7195; and Early Clinton C. I. 7192, all from the Spring Sown Uniform Red Oat Nursery. Low test weight has detracted from the otherwise favorable performance of Clinton x (Victory x (Victoria x Hajira-Banner)) C. I. 7020.

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NEW HAMPSHIRE

by Leroy J. Higgins (Durham)

Southeastern New Hampshire had its largest amount of snow for several years in March and early April. Early April was so cold and wet that planting time was delayed.

The climatic data for Durham and vicinity follows:

Rainfall in Inches

	April	May	June	July	4 Months' Total	Average Per Month
1956	3.59	2.14	2.10	2.96	10.79	2.70
Mean (over 50 years)	3.57	2.87	3.47	3.37	13.28	3.32

Temperatures in F. Degrees

1956	42.2	53.3	67.1	67.8	230.4	54.6
Mean (over 50 years)	43.8	54.7	63.6	69.5	231.6	57.9

The cooperative Northeastern nursery oat trials were not planted until May 7, 1956. As soon as the plants emerged they were dug out and eaten by pheasants which had been fed near the farm buildings by a sportsman all winter. Since seed was no longer available from the U.S.D.A., New Hampshire went without trials in 1956.

In the State there were several reports of good oat yields of the varieties Ajax, Clarion, and Garry. For the first time in the history of the State, a field of Garry oats at North Hampton was inspected for certification by two members of the University Agronomy Department and a U.S.D.A. pathologist.

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NEW JERSEY

By Steve Lund (New Brunswick)

Oat yields were down slightly from the record high of 1955 but were still five bushels above the ten year average. Spring oat plantings were delayed by the cold wet spring and the quality of much of the grain was low.

The cold spring also created a severe chickweed problem in winter oats. Some fields were so severely infested that they were plowed up and many of the yields were reduced by this weed.

Neither stem nor leaf rust were prevalent in New Jersey in 1956 but red leaf was present in most spring oat fields.

Dubois was added to the recommended oat varieties in 1956 and a considerable acreage of this variety was planted.

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NEW YORK

Investigations of Interest Under the Oat Project

by N. F. Jensen, E. J. Kinbacher and A. A. Johnson (Ithaca)

Spring Oats in 1956

One of the smallest oat crops in years was produced in New York because of a late, wet spring unfavorable for planting oats. Yields per acre were satisfactorily high, averaging 44.0 bushels, but total number of acres harvested was estimated at 561,000. A total of 24,684,000 bushels was estimated.

Maximum distribution to farmers of the recommended Garry variety was made in the spring of 1956 with a total of 500,000 bushels available for planting. It is estimated that up to 35% of the total acreage was planted to this variety. Varieties sown to the remainder of the acreage were Clinton, Mohawk, Rodney, Ajax, and Craig. Stem and crown rust were not major factors affecting general production in 1956.

New York Regional Variety Nurseries

The following data represent averages of yields and test weights obtained from nurseries at 12 locations (Eight replicates at each location).

Variety	Bushels per acre	Test weight lbs./bushel
Garry	94.7	33.5
N.Y. 618	91.0	32.1
N.Y. 556	88.8	31.2
N.Y. 611	87.8	31.7
Ajax	85.6	32.2
Rodney	84.2	34.4
C.I. 6938	83.6	34.4
Craig	70.5	30.9
Burnett	69.3	34.0
Newton	63.2	34.4
C.I. 6913	59.2	34.3
Bentland	58.2	34.0
Mohawk	54.6	33.5
Logan	51.4	32.3

Results such as these, which are consistent with those of recent years, are most gratifying to those who have sponsored the Garry variety in this area.

John Welsh Honored at Cornell Seed School

John N. Welsh, Cereal Breeding Laboratory, Winnipeg, Manitoba, Canada, was presented a citation at the Eighteenth Annual Cornell Seed School, November 27, 1956, for his efforts and those of his colleagues in developing the Garry oat variety. The citation was presented to Mr. Welsh by Cornell Provost S. S. Atwood, on behalf of the New York Certified Seed Growers Cooperative, the New York State Seed Association, and the New York Foundation Seed Stocks Cooperative. Dr. Atwood's remarks covered Mr. Welsh's achievements in the developing of his other varieties and dwelt particularly upon the Garry variety and its value to New York farmers.

Mr. Gordon Whiteside, Ottawa, also attended the Seed School and gave a well-received talk on the subject of the development and release of new varieties of grain in Canada.

Dr. H. H. Love Returns to Cornell

Dr. Harry H. Love returned to Ithaca in August from 6½ years in Thailand where he directed the national rice improvement program for the Thai government. Dr. Love was formerly Head of the Department of Plant Breeding at Cornell in charge of the genetics and breeding work with the small grains, and is the author of numerous articles on oats as well as other crops.

Graduate Students

The following students hold assistantships in small grain breeding in the Department of Plant Breeding:

Mr. Emil Sebesta, B.S., South Dakota State; M.S., Oklahoma A & M.
Mr. W. Stanley Young, B.S., Ontario Agricultural College; M.S. Cornell Univ.
Mrs. Lillie O. Chang, B.S.A., National Kwangsi University; M.S.A., O.A.C., University of Toronto.
Mr. Keith Jones, B.S. and M.S., Iowa State College.

The following students completed graduate work during the year:

Mr. Constantinos Scapariotis, Greece: M.S. Thesis entitled "The inheritance of earliness in field crops." (52 pp.)

Miss Aphonratana Dunsubtra, Thailand: M.S. Thesis entitled "A review of rice genetics and an evaluation of progress in rice improvement." (224 pp.).

Dr. Wade G. Dewey, Utah: Ph.D. Thesis entitled "Genetic and Pathological Studies with dwarf bunt of winter wheat." (117 pp.).

Mr. Clyde Hart is an M.S. candidate with research interests in small grains; Mr. Suvit Pushpavesa from Thailand is a special student with interests in small grains.

Winter Oats

Interesting and satisfactory progress is being made in the early breeding and testing work with winter oats at Ithaca. The C. I. 5364 selection continues to show outstanding ability to withstand the winter conditions common to this area. No other oat closely approaches it in percent of survival or yield.

The study of the winter hardiness of lines coming from Brookhaven-irradiated seed of C.I. 5364 was continued in 1956. Thirteen lines were tested in a nursery of 3-rod row plots replicated 8 times. C.I. 5364, normal, was used as a check variety. The results showed that some lines yielded higher than C.I. 5364 but none significantly higher. On the contrary 6 lines were significantly lower in yield than the parent C.I. 5364. The yield of the highest line was 85.9 bushels per acre (this line was significantly higher in estimated percent survival in the spring) while the yield of C.I. 5364 was 83.3 bushels per acre. LSD at the 5% level was 8.8 bushels. One line was 2.2 pounds per bushel heavier than the parent C.I. 5364, however, this line was significantly lower in yield and the heavier grain weight might have been due to less competition and better nutrition.

These investigations are being continued. We are not drawing any conclusions at the present time. For one thing, variability and the effect of environmental factors are greater with material of this kind than is experienced with the hardier crops of wheat and barley. A longer period of testing, or more replications are required. It was evident that some different appearing types came out of the Brookhaven-treated material. In the main these were not retained since our

principal interest was increased hardiness. Of the lines now being tested all are similar in appearance to C.I. 5364. In this nursery the correlation between estimated survival in the spring and final yield was good.

A varietal yield nursery of 21 entries in 3-row plots replicated 5 times was also grown with the following results:

Entry	Estimated Spring survival (%)	Yield bu./A	Test wt. lb./bu.	Percent groats
Brookhaven Line 32	66	49.3	30.9	75.2
C.I. 5364 check	67	48.5	32.6	74.3
Brookhaven Line 25	71	47.9	30.9	73.9
" 6	66	47.1	31.7	72.8
" 1	67	44.0	31.8	74.9
" 27	65	43.2	31.9	74.1
" 2	60	42.2	31.3	75.1
C.I. 6980	42	34.6	36.4	75.1
Wintok	21	24.0	35.2	77.6
C.I. 6904	33	23.8	32.3	72.0
C.I. 6905	23	18.7	32.7	75.6
C.I. 6982	12	16.6	33.8	71.9
C.I. 6981	9	13.5	35.2	74.0
Dubois	8	10.2	35.0	74.1
C.I. 6727	5	8.5	33.0	73.1
C.I. 6989	3	7.6	34.0	75.2
LeConte	tr	0.6	--	--

The average of all C.I. 5364 checks (several hundred) from 3 nurseries was 78.7 bushels per acre. This is a respectable yield of oats and supports our belief that a variety of good agronomic type with improved quality characteristics, having hardiness equivalent to C.I. 5364, would have a place as a starter variety in New York.

A third nursery contained approximately 450 oats selected from F_5 head rows in 1955. These were grown in plots 3 rows in size with a single check row of C.I. 5364 every tenth row. Most of these selections were from spring x C.I. 5364 crosses. Approximately 120 were saved and are being continued in 1957. Two lines were distributed for the 1957 USDA winterhardiness nursery, more for the purpose of obtaining a relative gauge of progress rather than from any belief that these selections are finished products, which we know they are not.

We would like to emphasize again that our principal objective at this stage of work with winter oats in this area is to recover, or exceed, in an oat of a better agronomic type, the winter hardiness of C.I. 5364. Aside from hardiness C.I. 5364 appears to have but one other good quality -- yielding ability. For example, in the nursery from 1955 F_5 head rows, just mentioned, its average yield from 116 check rod rows was 104.2 bushels per acre. This yield was obtained on a field of Dunkirk heavy clay on a northern slope after the unusually long winter of 1955-56.

The entries from the U.S.D.A. winterhardiness nursery were sown at the Mt. Pleasant location east of Ithaca at an altitude of 1700-1800 feet. Only one entry, C.I. 5364, survived and produced mature plants in 1956.

Laboratory Cold Screening of Winter Oats

Eight selections from C.I. 5364 seed irradiated at Brookhaven National Laboratory and 11 selections from C.I. 5364 x spring oat variety (Advance, Craig, Bond and Goldwin) are being tested for cold resistance in the freezing chamber.

An interesting result observed to date was that none of the 8 Brookhaven selections ranked better than the parent C.I. 5364 used as a control in the tests. While four of the C.I. 5364 x spring oats selections were ranked more resistant to cold than the winter parent C.I. 5364.

The above observation was based on a 200 plant population for each of the selections. The cold screening will be continued to verify the results.

Barley Yellow-Dwarf Virus Disease of Oats in New York in 1956

by W. F. Rochow, R. S. Dickey, D. A. Roberts (Ithaca),
and H. H. McKinney (Beltsville)

Although R. M. Endo had shown that the barley yellow-dwarf virus disease was present in at least a single location in New York, little was known about the distribution or importance of the disease in this area of the country. As a first step in a newly initiated cereal virus research program, surveys were made during the growing season of 1956 to determine the distribution of this disease on oats.

About 70 fields of oats in 22 counties were examined. Symptoms of the disease were remarkably free from complication by other diseases, and were similar to symptoms of the barley yellow-dwarf virus disease of oats observed by some of us in other parts of the U.S. Although the red-leaf symptom was observed in some fields late in the season, this symptom was not typical of the disease. Diagnosis was confirmed in some cases by virus transmission from suspected plants by means of apple-grain aphids.

About 7 of the fields examined had an estimated 20-30 per cent infection. A few fields had as many as 50 per cent infected plants. Although data on yield loss were not obtained, several growers reported substantial losses in yield in severely infected fields. Most of the fields observed, however, had only a trace of the disease. It is considered important that, with very few exceptions, every field of oats observed contained some plants with symptoms of the barley yellow-dwarf virus disease. Heavy infestations of aphids were noted on small grains throughout most of the growing season.

Although information is lacking on many areas of New York, the 22 counties surveyed in 1956 include all parts of the state. The barley yellow-dwarf virus

disease of oats is as widespread in New York as in other areas that have been investigated.

Possible New Rust Resistance in Oats Obtained in an Irradiated Population*

by Calvin F. Konzak (Brookhaven)

Among several lines of Clintafe oats which produced mutants for rust resistance, one line (originating from a single X-rayed seed) produced 33 M_2 progeny, among which 4 were found resistant in the field to an artificial epiphytotic of stem rust race 7a. Three of the resistant plants showed a typical type 1 mature-plant rust reaction, and the fourth carried larger but still resistant type pustules, estimated at the time to be 2-. Several of the plants in the line, including the latter mutant, showed partial sterility. Progeny from the latter mutant were subjected to tests in the greenhouse and in temperature and light controlled chambers. The tests showed definitely that the response of the mutant was different from that of either the Richland or Rodney varieties to race 7a. In this respect the mutant showed a type 1 to 1+ reaction at 70 to 75°F. in contrast to a 1 for Richland and a 3++ to 4 for Rodney. The rust development at this temperature was somewhat slower on Rodney than on Markton or Clintafe. At 85°F., the pustules on the "new" mutant developed chlorotic areas and spread, and eventually became medium to large type 3 to 3+ pustules. Richland maintained a type 1+ pustule at this temperature, though some enlargement of the pustules was evident. Rodney showed type 4 pustules at high temperature.

Among the 11 progeny of this mutant tested to date, 10 have shown the mutant type of rust reaction to race 7a and one has been susceptible. A high degree of (self) sterility has unfortunately been characteristic of the 12 plants. Backcrosses will be attempted as a means of recovering the resistance in stable germ plasm. Two progeny from a sister mutant plant resembled the Richland type of resistance with slightly more rust development at high temperature than was observed on Richland. Further tests are needed, however, to bear this out. The culture of race 7a originated from an isolation in Canada by Dr. B. Peturson, who kindly furnished us with inoculum. A pure culture of this rust race has been maintained by lyophilization. Tests with other cultures of the same race and with different race cultures are now in progress.

The results discussed might serve to point out that new germ plasm for stem rust resistance in oats can still be found, even though on the strength of the evidence one may not be fully justified in suggesting that the origin of this apparently new type of rust resistance in oats originated as the result of mutagen treatment. The treatment may have furnished only the reason for the search for such germ plasm, but on the other hand, in a crop so widely and thoroughly screened for natural factors, one would expect new mutant types to appear only rarely even after mutagen treatment.

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*Research carried out at the Brookhaven National Laboratory under the auspices of the U. S. Atomic Energy Commission.

Fungi and Treatment Injury in Oat Seed

by Willard Crosier, New York State Agricultural Experiment Station
Cornell University, Geneva, New York

Samples drawn from every lot of oats grown in, or brought into, New York under the certification program were examined for fungi and seed-treatment injury. These examinations were integrated with the routine analyses for mechanical purity and measurements of viability. The appearance of dry seeds under luminescent light[1] and the susceptibility of seedlings to races of stem rust[2] have also been utilized in the evaluation of seedstocks.

These criteria-presence of fungi, mercury injury of seedlings, glume color under ultra-violet light and seedling reaction to stem rust were also used in determining if oats being sold for seed had been accurately labeled.

As shown in Table 1, about 78 per cent of the oat seed lots sold in this state in 1956 were treated with a mercurial fungicide. The red-dyed liquids were slightly more popular than the colorless dusts and slurries. Most of the seed from Canada had received either Ceresan 365, Nema, Panogen, Setrete, or another liquid formulation while dust and slurry applications were more commonly used by New York growers. The presence of a chlorinated hydrocarbon or other insecticide was not demonstrated on any sample.

The records do not clearly show that mercury poisoning increased during storage since the inspection samples tested 6 to 10 months after treatment were as free from injury as the service samples tested only a few weeks after treatment. That mercury formulations did become phytotoxic during storage is indicated by these facts: 1) injury in service tests occurred most commonly in samples taken from carry-over seed lots, and 2) certain seed lots known to be depreciated in viability by chemical poisoning were not offered for sale.

Signs or symptoms of fungi appeared on germinating seeds of all varieties of oats. The rates of occurrence in the late 1955 and the early 1956 crops were only slightly different from those of the 1954 and early 1955 crops as reported last year.

The black stains from Septoria avenae developed on 87 per cent of the samples of Garry, but on only 57 per cent of all other varieties. This difference may be due to environal factors rather than to actual susceptibility to the blackstem fungus.

Alternaria tenuis discolored every sample of non-treated oats produced in New York. It was not common on Illinois- or Iowa-produced seed of intermediate frequency on seed produced in the province of Ontario.

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[1] L. D. Herink and E. C. Waters, in charge of certification testing, have used ultra-violet light in detecting mixtures of oats.

[2] Dr. L. W. Hittler, in charge of genetical-purity testing, has used races of stem rust to indicate varieties of oats.

Both Epicoccum neglectum and E. purpurascens have been isolated from germinating seeds of Craig and Garry oats. At least one specie was present on one or more samples of every variety sold in New York. These fungi did not interfere with germination testing.

If present on non-treated seed, Fusarium roseum usually destroyed seedlings during a 7-day germination test. On treated oats this fungus usually vegetated sparsely on the infected seeds but did not spread to adjacent seedlings. Garry and Rodney were comparable to other varieties in respect to the presence of F. roseum in the seed. The graminearum spore form was predominant in the eastern-grown seed, while both the culmorum and graminearum forms were found in Illinois- and Iowa-grown seed. The species, F. equiseti and F. poae were frequently isolated from wheat, but not from oat, seed in 1956.

Table 1. Effect of Seed Treatments Upon Germination of Oats Sold in New York in 1956.

Extent of seedling injury as seen in germination testing	Per cent of treated samples producing mercury-injured seedlings					
	Red-dyed seed			Non-dyed seed		
	1955-S*	1955-I	1956 S	1955-S	1955-I	1956-S
None	74	81	81	68	67	65
Slight	9	4	11	7	8	16
0.5 - 2%	15	10	5	15	19	15
2.5 - 5%	1	5	3	4	4	3
5 +%	1	0	0	6	2	1

Samples examined were treated with	Number of samples examined from		
	1955 Service*	1955 Inspection	1956 Service
Not treated	179	26	106
Red-dyed mercurial	186	97	121
Non-dyed mercurial	159	86	99

The dates 1955 and 1956 indicate the years the seed was produced; tests were made in 1956 or in January 1957.

Table 2. Signs or Symptoms of Fungi Observed on Seedstocks of Oats.

Variety name	Number of samples examined		Number of germinating samples with evident					
			Alternaria tenuis		Septoria avenae	Fusarium spp.		Epicoccum spp.
	Tr.*	N.T.*	Tr.	N.T.	Tr.	Tr.	N.T.	N.T.
				1955 Crop				
Advance	6	2	0	2	4	1	1	1
Ajax	32	11	4	11	25	0	2	5
Beaver	8	2	0	2	4	0	0	1
Clinton	66	28	2	28	36	0	0	15
Craig	57	70	2	67	33	0	1	31
Garry	256	27	11	27	215	2	1	9
Mohawk	67	44	1	44	44	0	2	18
Rodney	57	10	1	10	35	0	1	3
Others	7	7	1	7	5	0	1	3
				1956 Crop				
Advance	1	0	0	0	0	0	0	0
Ajax	5	1	0	1	1	0	0	0
Clinton	15	0	1	0	5	0	0	0
Craig	17	1	0	1	4	0	0	0
Garry	103	61	1	33	99	4	9	34
Mohawk	9	3	1	3	4	0	0	2
Rodney	10	3	0	3	5	0	1	2
Others	0	8	0	8	0	0	0	4

*Tr. indicates treated, and N.T. indicates non-treated seed.

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OKLAHOMA

by B. C. Curtis, A. M. Schlehuber, R. M. Oswalt, and L. I. Croy

Oat production in Oklahoma in 1956 was considerably better than in 1955, but left much to be desired. Total grain production was almost 13 million bushels, one million higher than in 1955, but almost 1.5 million below the 10-year average, 1945-54. Oats harvested for grain was 683,000 acres, 21,000 acres less than in 1955 and 17,000 acres less than the 10-year average. The average yield per acre of 19.0 bushels in 1956 was almost 1 bushel lower than the 10-year average and 2 bushels higher than the average yield in 1955. Drought was the major contributing factor to lower production of oats this year in Oklahoma.

A new objective of producing a hay and/or silage type oat has been incorporated into the oat breeding program at the Oklahoma Experiment Station. Results of a survey by the Oklahoma State Board of Agriculture on the utilization of the

planted oat acreage in 1955 showed that approximately 60% of the acreage was used for hay, pasture, and silage production and about 40% for grain production. A total of 328,000 tons of grain hay (including all grains except sorghums) was produced in 1955 and 176,000 tons was produced in the "dry" 1956 compared with the 10-year average (1945-1954) of 105,000 tons. It is known that a large share of the hay came from oats.

An oat hay yield nursery consisting of 10 "tall leafy type" varieties seeded in replicated 4 ten-foot rows was initiated in the 1956-57 season for the purpose of screening out the best hay types. A "rod-row" will be harvested from each plot when the plants reach the soft dough stage. The entire plant will be removed and both green and air-dry weights will be recorded. In addition to the hay yield nursery a large observation nursery consisting of tall leafy strains from the breeding nurseries is being grown for initial screening.

A new strain, Early Clinton C.I. 9172, offers much promise as a potential breeding source for increasing the test weight of oat varieties. This strain has been tested for 4 years in rod-row trials at the Oklahoma station and for 1 year in the Uniform Spring-Sown Red Oat Yield Nursery. Results from the tests indicate that Early Clinton has the ability to produce an exceptionally high test weight. In Oklahoma this selection has averaged 4.0 pounds per bushel higher than Andrew, the best spring oat variety for the state. Coffman's preliminary summary of data on the Uniform Spring-sown Red Oat Yield Nursery grown at 15 locations in 1956 shows the average test weight of Early Clinton to be 4.9 pounds heavier than Andrew and 4.5 pounds heavier than Clinton "59".

Early Clinton is a re-selection made in 1950 from an early Clinton Selection made in 1946. This strain is approximately a week earlier in maturity than Clinton C.I. 3971 and 5 days earlier than Andrew. Results indicate that this selection is equal to or better than Andrew in yielding ability. Its straw strength approximates that of Clinton. According to Bill Roberts, U.S.D.A. University of Minnesota, Early Clinton is resistant to race 7 at 75° and 85°F. and susceptible to races 6 and 8 at 75° and 85°F. A rust reaction of this type suggests that C.I. 7192 may have the Richland factor or gene A as its source of stem rust resistance. Clinton is resistant to race 8 at 75° and 85°F. and susceptible to races 6 and 7 at both temperatures. This strain will be crossed with a number of winter oat varieties in an attempt to transfer the high test weight character and disease resistance to a winter type adapted to Oklahoma.

Cimarron continued to perform well as a "two-way" oat variety. Its high yielding ability from both fall and spring seeding has caused it to become a very popular variety. Cimarron and several of its derivities when not limited by diseases have a very high yield potential. In an irrigated test at Altus, Oklahoma in 1956 Cimarron and 2 of its derivatives, Cimarron X Traveler C.I. 6988 and C.I. 7128, were the highest yielding strains, producing 99.6, 114.6, and 115.2 bushels per acre, respectively. Cimarron also produced the highest yield (106.5 bu.) among the varieties in 13 state-wide dryland tests.

The yield data in the accompanying table are from tests conducted in 16 counties in Western Oklahoma and 9 counties in Eastern Oklahoma. These counties represent the major winter oat growing areas of the state. Each variety is compared with Forkedeer for the same tests in each area.

Arkwin and Mustang were grown in only the southern part of the western area, because of their lack of winterhardiness. Arkwin has had severe freeze injury in some locations each year in the southwest and some injury in the northeast. Mustang has had some freeze injury in the same areas but has had better recovery from the freeze than Arkwin. Mustang's 6% yield advantage over Forkedeer in western Oklahoma is probably due to its resistance to several races of crown rust. Bronco has a yield advantage over Forkedeer in both areas of the state. Bronco is resistant to several races of crown rust and seems to be more winter-hardy than Mustang. Cimarron has no more resistance to the rusts and smuts than Forkedeer, but is early enough to escape severe rust damage most years. Cimarron is equally as winter-hardy as Tennex and Forkdeer and has yielded 8% more than Forkedeer in 35 tests in western Oklahoma. In the eastern area a leaf disease ("Cimarron oat Disease") usually develops on Cimarron that does not seem to attack the other commercial varieties, which probably accounts for its lower yield, (11% below Forkedeer in 23 tests in the eastern area).

Yield of Types and Varieties of Fall-sown Oats, Grown in the Oklahoma State-Wide Small Grain Test Plots for 3 Years, 1954-1956.

C.I. No.	Types and Varieties	No. tests	Yield bu./A	% of Forkedeer for the same tests
	Western Oklahoma - 16 Counties			
	Fulwin Derivaties			
4660	Mustang	24	47.1	106
6571	Bronco	22	45.9	107
	Winter Fulghum Sel.			
3169	Tennex	38	39.0	99
3170	Forkedeer	38	39.5	100
	Hardy Winter Types			
3424	Wintok	38	39.4	100
5106	Cimarron	35	41.0	108
	Miscellaneous Winter Types			
5850	Arkwin	18	31.3	89

Eastern Oklahoma - 9 Counties

	Fulwin Derivaties			
4660	Mustang	23	58.1	96
6571	Bronco	14	64.0	105
	Winter Fulghum Sel.			
3169	Tennex	24	58.7	100
3170	Forkedeer	24	59.0	100
	Hardy Winter Types			
3424	Wintok	24	53.0	90
5106	Cimarron	23	53.1	89
	Miscellaneous Winter Types			
5850	Arkwin	24	54.4	92
4657	Arlington	9	53.1	91
3923	DeSoto	9	40.9	70

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OREGON

by W. H. Foote (Corvallis)

New Variety

A new grey winter oat has been released by the Oregon Agricultural Experiment Station. This variety is a selection from a cross of Fulghum x Custis and has somewhat better straw than the commonly grown Grey winter variety. This variety was named Crater and it is being recommended for southern Oregon and areas in the Willamette Valley where lodging is severe.

Oat Production

The Klamath Basin of Oregon, long a malting barley area, "is beginning to feel its oats." Oats are replacing Hannchen barley because of less risk of damaging August frosts and a decline of malting barley prices brought about by the present surplus barley program. The variety Overland has replaced older varieties in this area and the new variety Park is being tested on farms.

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PENNSYLVANIA

C. S. Bryner, and E. A. Hockett (U.S.D.A.), (University Park)

The 1956 oat crop was down this year from the record years of 1955 and 1954. Record yields were reported by farmers in some sections but the poor harvesting conditions in the northern and western part of the state resulted in acres of the crop not being combined. Average yield was 38.0 bushels. Winter oats acreage is holding at an estimated 50,000 acres. Winter killing was severe on oats planted in early September.

Varietal recommendations are: for spring oats, Garry, Clinton, Craig and Ajax; for winter oats, Dubois and LeConte. Rodney a spring oat variety recommended in other areas has yielded as well as Garry but is not as stiff strawed.

Crown rust was very severe in the spring oat nurseries giving excellent information on resistant varieties. Red leaf was observed and was particularly severe in an observation trial of 373 strains of the U.S.D.A. World Oat Collection.

Research studies are in progress in the laboratory and field to develop satisfactory freezing techniques for evaluating winter hardiness. Field studies on the effect of rate and date of seeding winter oats are being continued. Present evidence is that on moderately fertile soils in Southeastern Pennsylvania seeding $2\frac{1}{2}$ bushels per acre around September 20 appears best. One trial of sixteen winter oats varieties planted in the spring indicate that Dubois and LeConte, the two varieties recommended, will not perform well when spring planted. (Bryner)

Several promising lines have been obtained from a nursery of Hardy x Hardy winter oats and are now in a yield test at two locations. Crosses were also made between these lines in an attempt to find increased winter hardiness by means of recurrent selection.

An experiment utilizing flats of winter oats placed in the field has been initiated in order to study the relationship between field hardening and survival after exposure to freezing in a controlled temperature chamber. In addition, sets of flats are being brought into the greenhouse at regular intervals during the winter in an attempt to ascertain the time of killing in the field.

Approximately 3000 head row selections and 5000 bulk rows of hardy germplasm are being evaluated at three locations - one with winters so severe that winter barley usually does not survive.

A forage (silage) test of ten winter oat varieties is being grown at two Southern Pennsylvania locations and a straw mulch experiment using 0, $\frac{1}{2}$, 1, 2, and 4 tons of straw per acre on the varieties Wintok, Dubois, LeConte and CI6980 is being grown at University Park, Pa. (Hockett)

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SOUTH CAROLINA

by W. P. Byrd, R. W. Earhart and E. B. Eskew (Clemson)

Oats for grain were harvested from 551,000 acres in 1956 with an average yield of 36 bu. per acre. This compares with 27.5 bu. per acre for the previous year. The use of oats as temporary grazing is increasing in importance. The majority of the oats planted in South Carolina are of the varieties, Victorgrain 48-93, Arlington, and Fulgrain.

An unusually dry fall in most parts of the state in 1956 hampered seedings and delayed germination for all seeded grains. The infestation of greenbugs was extremely severe in all parts of the state and varying degrees of damage have been reported. Where adequate moisture was available, the oats have made considerable growth because of the above normal temperatures of December.

Breeding Program

The breeding program at Clemson is in the formative stages. The objectives are to obtain better agronomic varieties with special emphasis on securing disease resistance. Much effort will be devoted to the development of varieties which produce high forage yields. It is desirable to find varieties which make considerable growth in late fall and winter when the temperatures are low. It is mandatory that we have varieties resistant to Victoria blight and similar diseases if we are to seed early and make the maximum use of our oats for grazing.

Plans are being made to study the inheritance of the reaction of resistance to soil-borne mosaic of oats. An area of land is available which is rather uniformly infested with the disease causing factors.

Pathological Problems

Of the oat diseases causing trouble in South Carolina, soil-borne mosaic is probably the least understood both from its distribution and the amount of injury that it is responsible for causing. The general problem has been described by other workers: McKinney (4), Moseman, et al (3), and Hadden and Harrison (2). Atkinson (1) initially surveyed this situation in the Carolinas and reported his findings in 1945. His results were confirmed by disease surveys of 1956 in which this condition was found in 23 counties. These counties were distributed with 11 occurring in the Piedmont, and 12 in the Coastal Plain.

McKinney (4) estimated crop losses as occurring from this disease in North Carolina, based on reduced production from the susceptible variety Letoria, as being about 45%. In some preliminary control tests conducted at Clemson using chloropicrin as a preplanting soil drench, he secured an average of about 30% reductions in yield from the untreated plots. In this latter trial he assumed that a major portion of this loss in production was due to the action of mosaic.

In the spring of 1955 severe damage was being manifested by the oat crop being grown on some bottom land adjacent to the Clemson Campus. Initial observations indicated that some of this damage was due to infection by soil-borne mosaic; however, it was disturbing to note that oat varieties were being attacked which had previously been reported as having some resistance.

To secure a better understanding of this situation, a portion of this infested area was used for an oat varietal evaluation nursery. The variety Arlington, which represented an adapted variety with better than average resistance to mosaic, was planted on a portion of this same area. In March of 1956 when evaluations of mosaic damage were being made, the surrounding field of Arlington showed high amounts of injury, as well as, the varieties in the evaluation nursery.

In the evaluation nursery, Letoria was included as a control in every tenth row to give the distribution of severity of mosaic in the nursery. At the time of evaluation, most of the Letoria plants were dead, with the remainder severely stunted and showing severe leaf symptoms.

In addition to the stunting and leaf symptoms of mosaic that were present on the varieties in the evaluation nursery, there was a high amount of stand loss in many of these varieties. The reason for this is not known; however, subsequent work, now in progress, indicates that there is more to the disease complex in this particular area than mosaic as we had known it previously. The exact nature of these additional factors is not known, but the possible action of other oat pathogens is being studied.

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SOUTH DAKOTA

by V. A. Dirks and L. S. Wood (Brookings)

Oat Diseases

Losses due to stem rust in 1956 were estimated not to exceed 2%. Although stem rust was general infection was relatively light in severity due to a late build up of inoculum. Crown rust occurred only in trace amounts.

Septoria leaf blight and black stem were damaging only in a few local areas in the northeastern part of the state. Red leaf was light this year and caused little damage. The so-called physiologic leaf spot, or non-parasitic leaf spot, was widespread and caused some concern to the farmers early in the season. By mid-season the damage subsided and the extent of any loss which may have occurred is not known.

The use of certain seed treatments in 1956 gave excellent increases in total stand counts. The following treatments and corresponding increase in stand of Vikota oats were obtained.

Rank	Treatment	$\bar{X}$ Stand Count	% Increase in stand
	Check	707.2	
1	Panogen	1117.0*	58
2	Ceresan M	1103.0*	56
3	N. I. Ceresan	1020.5*	44
4	Captan	1019.0*	44
5	Agrox	902.5*	28
6	Mema	860.0*	22
7	Mergamma	853.2*	21
8	Cy-Trete	799.0*	13
9	Puraseed	536.0	-24
	L.S.D. 29.6		

Stand counts were made on the two center 12 foot rows of four row plots which were replicated four times. Approximately 600 seeds were planted in each of the two center rows.

The Vikota seed was of poor quality being light and badly weathered. Planting date was April 21 and the soil was cool and moist for 10 days following planting. All treatments except Puraseed gave significant increases in stand with Panogen and Ceresan being outstanding followed closely by N. I. Ceresan and Captan. The treatments were applied at the recommended rates and the reason for the significant decrease in stand with Puraseed is not known. The significant increases in stand did not follow through in all cases to give significant increases in yield.

This may be due to the fact that the plants in the check plots with thinner stands tillered more than the plants in the seed treated plots. Thus, a comparable number of panicles were produced on both the check and seed treated plots so that yield differences were not significant. Only the Panogen treated plots gave significantly higher yields than the check plots.

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TENNESSEE

by N. I. Hancock (Knoxville)

Data accumulated the past 3 years on the physical measurements of culms at maturity show that some of the characters may be associated with lodging in oats as well as in the other grain crops, because all of them had the same pattern of growth in each of the past 3 seasons. In oats there are usually 5 to 6 internodes. Beginning at ground level the first internode measures from 1" to 2", second internode 2.1" to 3.5", third internode 3.6" to 6.0", fourth internode 6.1" to 10" and fifth internode supporting the panicle 10.1" to 20", while the panicle measures from 7" to 12". The diamter of the stem tapers from .40 to .50 cm. on first internode to .10 to .15 cm. on fifth internode, while the wall thickness drops from .30 to .40 mm. on first internode to .20 to .25 mm. on fifth internode. The length of the panicle and its supporting internode varies from 45% to 55% of total length of culm while their weight varies from 50% to 65% of the total weight. Hence the culms of oats are top-heavy, hollow, jointed, cylindrical and tapering structures, which usually break between 2nd and 4th nodes and sometimes at the nodes during a severe wind storm. Also, the panicles of many oat varieties have tendency to nod, causing the supporting internode to bend at an angle of 10° to 65°, thereby throwing additional weight upon the stem. Thus, size and its corresponding weight of panicle must be balanced with tillering to counteract loss in yield, and the panicle retained at as small degree of angle as possible to diminish lodging.

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TEXAS

by I. M. Atkins and J. H. Gardenhire (College Station, and Denton)

Oat production and research in Texas was greatly hampered by the drought which in many sections of the state is in its fifth year. Rainfall at many locations was the lowest since records have been kept and generally from 40 to 60 per cent of average.

The new winter hardy variety Bronco was released this season with some 1200 bushels going to certified growers in Texas and Oklahoma. This variety is a sister of the widely grown variety Mustang both being selected from the cross of Lee-Victoria x Fulwin. It differs from Mustang in being taller, later maturing and having a light red colored kernel of good plumpness. It has less resistance to crown rust but is resistant to Helminthosporium blight and more tolerant to mosaic.

The new so-called "forage oats", Tennex x Victoria-Hajira-Banner, C.I. 6994 and Fulwin Composite Cross, C. I. 6993 continue to show unusual promise as forage and grain producers. These lines combine resistance to many races of crown and stem rust with resistance to Helminthosporium blight. They have an unusual combination of hardiness and rapid forage production from fall to spring which makes them of unusual value in Texas. Lines purified for disease resistance are in the first stages of increase in 1957.

The rusts were of minor importance this season because of the drought. However, the race 213 complex was prevalent at Beaumont, Prairie View and College Station and penetrated to the main oat growing area near Denton so it is feared these races may give serious trouble soon as most varieties grown are Victoria derivatives and very susceptible to these races. Race 7a of stem rust was identified at Weslaco and this may indicate additional problems. Some unusually promising lines from crosses on Alamo, Mustang and New Nortex with derivatives of Landhafer may give protection to some of these new races.

Inheritance studies involving race 216 of crown rust, race 7a of stem rust, Helminthosporium blight, plant height and other agronomic characters were carried out in the field and greenhouse in a cross between a very short, strong strawed oat, Fulwin-Lee-Victoria x Red Rustproof-Richland, 145-44-43 and a disease resistant spring oat derivative of Landhafer. Some very desirable lines were isolated from this cross.

Helminthosporium blight studies are being continued and resistant lines developed from Alamo by irradiation continue to be of promise. Frequent reports of disease trouble in commercial fields indicate increased problems with the yellow dwarf virus disease.

World Oat Collection Screened for Greenbug Resistance

by Harvey L. Chada, Entomologist, U. S. Dept. of Agric.,
In cooperation with Denton Substation
Texas Agric. Exper. Station

During 1955 and 1956 the World Oat Collection, which was obtained from the Cereal Crops Section, Field Crops Research Branch, U.S.D.A., was screened for greenbug resistance. All screening was done in a controlled environment insectary. Andrew C.I. 4170 was used as the resistant check, as this oat variety showed more resistance than any other tested previously. Most of the varieties in the

collection were more susceptible to the greenbug than was the check. Only 683 of the 4998 had as much or more resistance than the check, and 77 were 10 per cent or more resistant than the check. Twenty-three of the latter were from the Mediterranean region. Because the check, Andrew, does not possess marked resistance, only the 77 more resistant oat varieties are being tested further. So far, no varieties possessing marked resistance to the greenbug have been found among the 5129 tested to date.

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UTAH

by R. W. Woodward, Agronomist; ARS, USDA, Field Crops Branch
Utah Experiment Station USAC, Logan, Utah

Oat production reached its low point in 1956, except for 1934, with a total of 32,000 acres. Yields were low on the Experiment Station while barley and wheat hit new highs. State average, however, of 46 bushels per acre have been exceeded only twice in 30 years. Oats for many years held equal ranks with barley, but now barley is grown on 6 times the area of oats.

No diseases were observed or reported in oats. Overland C.I. 4181 predominates the picture with only small plantings of Uton and other varieties. Most of the barley and oats are used for feed, therefore since barley yields so high in feed units per acre this crop is gradually replacing oats. The price differential at present favors oats which may tend to produce an equilibrium at somewhere near the present levels.

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VIRGINIA

By T. M. Starling, C. W. Roane and J. L. Tramel (Blacksburg)

Bronco has been added to the list of recommended fall sown oat varieties in Virginia for the area west of the Blue Ridge Mountains and for the northern Piedmont section. Bronco is a selection from the cross Lee-Victoria x Fulwin and was released by the Texas Agricultural Experiment Station. Seed supplies are limited at the present time but should be available in the near future. It is hoped that Bronco will be a replacement for Forkedeer oats in the region where recommended. It has not been markedly superior to Forkedeer from the standpoint of yield, but appears to have a much stiffer straw and lower lodging percentage, and is similar in winterhardiness.

Powdery mildew continues to be present in varying quantities on oats throughout Virginia. Although different varieties vary in their degree of susceptibility, no pronounced resistance has been observed among the varieties tested in Virginia. Approximately 1000 N_3 lines of irradiated Arlington oats were screened for reaction to powdery mildew, but no plants were found with resistance to this disease organism.

A study is underway to observe the variability of stem rust originating from barberry bushes. In the fall infected straw collected from oat fields in southwestern Virginia is scattered among barberry bushes which are well isolated from oat fields. A selected group of oat varieties is planted in a plot adjacent to the barberry bushes. Plants are examined carefully for susceptible type pustules. These are collected and are identified at St. Paul, Minnesota. Thus far, a subrace of race 5 which can attack Saia has been isolated. (Stewart, et als). This is a cooperative investigation with the U. S. Dept. of Agriculture and the Virginia Agricultural Experiment Station.

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WISCONSIN

by H. L. Shands

The average yield of oats in Wisconsin in 1956 was 46 bushels per acre, or equal to the 10 year average, but 3 bushels less than in 1955. Losses from diseases other than Septoria were down from 1955. Rust loss estimates in percentages compared with previous years are as follows:

Rust	1953	1954	1955	1956
Crown	5	3	2.5	1.5
Stem	7	4	3.0	1.5

Stem rust race 7-susceptible varieties showed moderate infection at many locations. Not much crown rust was seen in the northern half of the state. Mid-June heat and dry weather seemed to discourage crown rust. Plants in the Madison nursery wilted several days in a row. Plant height and lodging were reduced. Cool weather in late June and July favored good production because yields averaged 90.2 bushels per acre and 69.4 in the field plot tests of Z. M. Arawinko.

The Crop Reporting Service showed varietal acreage percentages as follows: Branch - 21; Sauk - 16; Clintland - 13; Ajax - 11; Clinton - 9; Bonda - 9; and Nemaha - 7. Clinton, Bonda and Branch lost from the previous years while Sauk and Clintland gained. Sauk and Clintland very probably will gain still more in 1957. Ajax and Nemaha remained constant.

Variety Performance

By courtesy of Seed Certification Service paired comparison for yield of 6 varieties are given. Also yields for all fields are given.

Varieties paired	Number comparisons	Yield per acre in bushels	Varieties paired	Number comparisons	Yield per acre in bushels
Ajax	17	43.1	Branch	18	43.3
Branch	17	48.2	Fayette	18	47.2
Beedee	28	43.3	Branch	36	42.8
Branch	28	41.8	Sauk	36	46.9
Beedee	48	58.1	Clintland	36	44.5
Clintland	48	42.2	Fayette	36	46.4
Beedee	64	53.5	Sauk	56	47.1
Fayette	64	48.2	Clintland	56	42.6
Beedee	85	49.6	Sauk	53	48.3
Sauk	85	46.1	Fayette	53	45.8
			Non-paired-All fields		
Branch	17	44.5	Ajax	42	45.7
Clintland	17	41.9	Beedee	128	52.7
			Branch	48	45.5
			Clintland	83	45.9
			Fayette	86	47.6
			Sauk	137	48.3

Below is given yield results in replicated trials of Wisconsin Experiment Station and outlying tests in cooperation with County Agents.

Variety	Exp. Sta.[1]	Outlying[2]
Ajax	67.0	76.3
Beedee	62.0	78.6
Branch	67.2	75.4
Clintland	43.3	70.1
Fayette	42.9	65.5
Sauk	68.0	73.3

[1] 8 locations including Madison field plots.

[2] 5 locations; data by D. R. Peterson and others.

The seed growers reports show lower yields than for 1955. The Experiment Station yields of Clintland and Fayette are low - possibly because some of the tests were on soils of low fertility. Yields of these varieties were higher in the outlying tests. There doesn't seem to be a close relationship of variety performance in the 2 sets of replicated trials. It is suggested that the seed growers exercised considerable choice (as they were advised) in field fertility. Ajax and Branch were probably grown on poor soils while Fayette and Clintland probably were on fertile soils.

Garry outyielded all varieties by nearly 10 bushels per acre for an average. Since this did not occur in 1955 an interaction of variety x year is indicated.

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In 1955, 16 crosses were made using approximately 30 varieties or selections with an assortment of different characters involving variations in adaptation, yield, lodging, bushel weight and the several disease reactions. The F_1 plants were grown in the greenhouse 1955-56, and the F_2 in the field in 1956. Eight double crosses were made in 1956 and the F_1 generation is in the greenhouse now. Triple, quadruple and quintuple crosses are planned for the future with the hope of introducing into the final cross a wide assortment of characters contained in parental varieties. Selecting may be started before the final cross is made. The order of crosses was planned so that a nearly-complete unit of characters would be available in groups of 4 varieties. However, wider character expression would be available in the 8-variety groups, 16-variety groups, etc. The plan has many features of the composite crosses of barley. Selections will be made for a combination of characters best suited for adaptation, high yield, good grain quality, and resistance to lodging and diseases under Wisconsin conditions.

Personnel notes: P. E. Pawlisch and R. A. Forsberg completed the Master's degree; L. N. Barker started assisting in the small grain program in September of 1956. L. G. Cruger expects to start assisting in February after nearly 2 years in the armed forces.

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Use of diuron (Karmex DL) for control of annual weeds in oats.

by K. P. Buchholtz and Z. M. Arawinko

A preliminary trial at Madison, Wisconsin, in 1955 showed that annual grassy and broadleaved weeds in oats might be controlled by foliage applications of diuron (3-(3,4-dichlorophenyl)-1,1-dimethylurea). Additional trials in 1956 controlled weeds sufficiently so that hand or mechanical weeding was not necessary in the oat nursery. Except for a few sensitive lines no significant injury to the oats occurred in any trial. The liquid preparation of diuron (Karmex DL) was preferred but the wettable preparation may be used if the spray solution is agitated. Applications of from 1/2 to 1 lb/A appear most satisfactory. Weeds should be small, not more than 1 inch tall, at time of treatment. Spray volumes of 20 gal/A appear

satisfactory. A mixture of 3/4 lb. of Karmex DL and 1/4 lb/A of 2,4-D was sprayed on the nursery about May 21, 1956, when oat plants were in 3- to 5-leaf stage. Soil was damp. Application of 3/8 lb/A Karmex DL on a late summers increase gave satisfactory control. Spring wheat appeared to be noticeably more sensitive than oats to diuron while barley was seriously injured in several trials.

Pre-emergence applications of 1 lb/A of diuron may give similar results to those from the foliage sprays if sufficient moisture is available to leach the chemical into the surface soil.

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Septoria Disease

by A. L. Hooker, (Madison)

The reaction of numerous oat varieties and selections to Septoria avenae was determined with artificial inoculations. Although the early part of the 1956 season was hot and dry, inoculations were successful and high levels of leaf and stem infections were obtained on susceptible varieties. Of the named varieties in the Spring Sown Red, Northeastern States, and North Central States Uniform Yield Nurseries, Beedee, Clintafe, Clinton, Columbia, Craig, Dupre, and Victory showed the lowest levels of disease. Stem and leaf infection was also low on selections with the following parentage: Clinton[4] Santa Fe, Clinton Reselect x (Landhafer x (Richland x Bond)), Clinton x (Victory x (Vict. x H-B)), D69-Bond x (V-R x Bannock), Erban x Boone, Goldwin x Boone, Goldwin x Clinton, Landhafer x (Richland x Bond), and Vicland x Erban. Strains with the C.I. numbers of 1090, 1251, 1268, 1384, 1591, 1592, 1638, 1649, 1923, 2173, 2254, 2711, 3806, and 4656 have consistently shown low levels of disease in extensive tests.

Varietal correlation studies have shown: 1) A positive and significant association between the leaf, stem, and kernel phases of the Septoria disease; 2) A positive and significant association between leaf or stem reaction at different geographical locations; 3) A positive and significant interannual correlation of leaf, stem, or kernel reaction to the disease; and 4) A significant negative association between stem or leaf reaction and heading date.

Cultural and pathogenicity studies have shown that Septoria avenae is a variable fungus. Although isolates may vary greatly in their virulence, little evidence for differential pathogenicity has been found.

Sporulating and pathogenic isolates of Septoria avenae are usually available upon request.

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V. NEW OAT VARIETIES

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Stem Rust Development and Physiologic Races in 1956*
by J. J. Christensen (Cooperative Rust Laboratory, St. Paul)

Oats grown for forage in south Texas were damaged by stem rust, and there were losses up to 1 percent on oats from Iowa northward and up to 3 percent in barberry eradication States east of the Mississippi River, where weather was more favorable for rust development than farther west.

Race 7 was the predominant race for the seventh consecutive year, although it decreased slightly in 1956, comprising 66 percent of the 475 uredial isolates identified. Race 7A, which can attack oat varieties with the so-called Canadian type of resistance, decreased from 4 percent in 1955 to 2 percent in 1956. Shifts in prevalence of other races also were slight. Race 2 (combined with 5) comprised 17 percent of the isolates, and race 8, 14 percent.

The potentially dangerous race 6 was identified twice from New York, and the closely related race 13 once from Maine. These races continue to be associated with barberry in northeastern United States.

*Received late.

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