1959

OAT NEWSLETTER

Vol. X

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March 1, 1960

Sponsored by the National Oat Conference

1959

OAT NEWSLETTER

Vol. 10

Edited and multilithed in the Department of Plant Breeding, Cornell University, Ithaca, New York. Costs of preparation financed by the Quaker Oats Company, Chicago, Illinois.

March 1, 1960

Sponsored by the National Oat Conference

Neal F. Jensen, Editor

ANNOUNCEMENTS

Because unavoidable time delays are involved in overseas correspondence foreign contributors are urged to anticipate the annual preparation of future newsletters and to submit articles or notes to the editor at any time of the year without waiting for the call for material. Your contribution of news will be carefully filed, and all material received by about mid-January will be printed in the current newsletter.

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Back issues of the following volumes of the Oat Newsletter are available and will be distributed on request as long as the supply lasts:

Year	Volume	Number of copies
1952	3	30
1953	4	28
1954	5	27
1956	7	43
1957	8	17
1958	9	30

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I. CONFERENCE AND REGIONAL NOTES

*** Report of the Chairman, National Oat Conference ***

The National Oat Conference or the Conference Committee did not meet during the past year. However, the committee appointed by the Chairman to explore the matter of standardization of genetic nomenclature in oats made a report. The committee composed of M. D. Simons (Chairman), W. M. Myers, F. L. Patterson, E. G. Heyne, and N. F. Jensen did an outstanding job and the conference is grateful for the comprehensive report. This report has not been approved by the Conference or Executive Committee.

W. H. Chapman, Chairman

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*** Secretary's Report - National Oat Conference ***

No meetings of the Conference Committee were held during 1959. However, several sectional meetings of interest were held during the year. The N.E. 23, Northeastern Small Grains Committee met twice. They met first in New York City, N.Y., January 5, 1959, and a second meeting was held, September 3, 1959, at Pennsylvania State University, University Park, Pennsylvania. At the Pennsylvania meeting it was voted to rewrite the Regional (N.E. 23) Project and to narrow the objectives for work to oats exclusively. The project title being "Developing Improved Oat Varieties for the Northeastern Region." At the meeting of N.E. 23 held at the Hotel Sheraton Atlantic, New York City, on January 4, 1960, Robert Pfeifer, of Pennsylvania, became Chairman and George Kent, of Cornell, was elected secretary for 1960. The matter of representatives to the National Oat Conference Committee was not considered at this meeting.

The Southern Small Grain Technical Committee met April 7 and 8 at the Memorial Student Center, Texas A & M College, College Station, Texas. At that meeting W. H. Chapman and T. M. Starling were elected to the National Oat Conference Committee. A biennial meeting of the Southern group has been proposed. Reports of the activities of the different sections will appear elsewhere and need not be repeated here.

At present members of the Executive Committee are as follows:

North Eastern Region	N. F. Jensen & Steve Lund
North Central	E. G. Heyne, John Grafius & Fred Patterson
Western	Harland Stevens and Calvin Konzak
Southern	W. H. Chapman (Chairman) & T. M. Starling
U.S.D.A.	
Cereal Branch Representative	L. A. Tatum
Oat Section Representative	H. C. Murphy
Editor of Oat Newsletter	N. F. Jensen
Secretary	Franklin A. Coffman

Franklin A. Coffman
Secretary to Committee

*** Report on Oat Monograph ***

During 1959, the fifteenth and final chapter of the monograph: Oats and Oat Improvement was turned over to the Editors of the American Society of Agronomy. The completed manuscript comprises some 1200 typed pages; included over 2000 literature references and possibly 175 pictures and graphs. It is understood that the Society is now in the process of obtaining bids for printing.

The book is scheduled to include a picture of Patrick Shirreff, the pioneer oat hybridist and breeder. Although pictures of other pioneers in cereal breeding have been published, so far as we have been able to learn, this likely will be the first picture of Shirreff ever to be published in an agricultural book on either side of the Atlantic. The print was obtained from The National Galleries of Scotland, Edinburgh through the efforts of Mr. Henry Edmunds, esq., of the British Embassy in Washington, D. C., who spent much time and effort in investigating probable sources in Britain but fianlly located a picture of the famous Scotchman and obtained a print ofit for our use in the monograph.

Franklin A. Coffman
Monograph Editor

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*** Report of Committee to Explore the Standardization of Genetic Nomenclature in Oats ***

In 1958 the chairman of the National Oat Conference designated a committee to explore the standardization of genetic nomenclature in oats. The committee submitted a brief preliminary report that appeared in the 1958 Oat Newsletter. The final report of the committee follows.

As the situation now stands there are no rules or even suggestions regarding genetic nomenclature of oats to guide investigators in this field. Consequently genes are named in haphazard fashion. The symbols that have been used often bear little relationship to the characters concerned, and various different symbols have sometimes been assigned to genes governing the expression of the same character. Even more confusing, the same symbols have occasionally been assigned to genes for entirely different characters. The study of the genetics of oats is now proceeding at an increasingly rapid pace, and can be expected under the present system, to lead to ever greater confusion. In view of these facts, and after due consideration of the problems that might be involved, the committee decided to recommend that some form of standardization of genetic nomenclature be adopted.

Standardized systems of genetic nomenclature have been established for corn, barley, and wheat. The basic references involved (corn: Cornell Univ. Agr. Exp. Sta. Mem. 180: 1-83, 1935; barley: Jour. Amer. Soc. Agron. 33: 47-64, 1941; and wheat: Jour. Amer. Soc. Agron. 38: 1082-1099, 1946) have been studied in detail. A later report on wheat, written by Dr. E. G. Heyne, was also studied. This report included a discussion of the recommendations of the Japanese geneticists. The committee corresponded with Dr. D. W. Robertson, barley geneticist at Colorado

State University, and made use of the valuable suggestions he made.

In 1957 a committee appointed by the Permanent International Committee for Genetics Congresses filed a report of their work in establishing a set of rules to be used as a guide by people in all branches of biology interested in genetic nomenclature (See Appendix I). Since these rules apparently have more official standing than any other guide presently available, it is suggested that they be adopted with such modifications as may appear desirable, by people studying the genetics of oats. These rules are rather general, and in several places suggest more than one alternative. In such cases only one of the alternatives is shown in the list below. International rules 1, 2, and 3 have been combined under rule 1, and have been amplified to provide specific suggestions for designating symbols for hereditary factors. International rules 4 and 6 have been combined, modified, and provided with specific suggestions under rule 2. The most significant deviation from the International Rules concerns the use of the plus sign to designate the "wild type". In view of the difficulties that would be involved in choosing and utilizing a "wild type" that would be satisfactory to all concerned, it is suggested that "wild type" alleles in oats not be designated by the plus sign. Rule number 10 does not appear in any form in the International Rules.

<u>Suggested Rules for Genetic Nomenclature of Oats (Adapted from International Rules)</u>

1. Symbols of hereditary factors (or characters), derived from their original English names, will be written in Roman letters. The name and symbol of a dominant will begin with a capital letter and those of a recessive with a small letter. Two alternative schemes governing the actual form of the symbols are presented:

   (a) In the case of a character usually designated by a single word, the first letter will be used. If the first letter has already been used, then the first letter plus a suggestive second letter, which will always be a small letter, will be used. If the factor is ordinarily designated by two or more words, the symbol will be comprised of the first letters of the first two words, plus additional small letters when necessary to prevent ambiguity. No two basic terms (such as leaf and lemma) will ever have the same symbol. When diseases or pathogens are involved, the terms "reaction", "susceptibility", and "resistance" will be understood and will not be represented in the symbol.

   (b) Symbols will be as short as possible, and will consist of the first letter of the first term of the character, followed, when necessary, by as many small suggestive letters as needed to distinguish the symbol in itself from all other symbols.

2. Two or more genes having phenotypically similar effects are designated by a common basic symbol. This will be construed, for example, to refer to crown rust reaction without reference to specific races of rust or varieties of oats. Non-allelic loci will be distinguished by an Arabic numeral on the same line after a hyphen following the basic symbol (for example, CR-7 would be the seventh gene for crown rust reaction discovered). The first locus to be discovered for a character will be understood to bear the number 1, so that if and

when a second locus is discovered, it will be number 2. Small letters, following immediately after the locus number, will distinguish members of allelic series (CR-7d). a and b will be understood to refer, respectively, to the original dominant and recessive allele-pair first discovered.

3. Inhibitors, suppressors and enhancers will be designated by the symbols I, Su, and En, or i, su, and en if they are recessive, followed by a hyphen and the symbol of the allele affected. (I-CR-7d would be a gene that inhibits the fourth allele of the seventh gene for crown rust reaction)

4. Lethals will be designated by l or L, and sterility genes by s or S, and will precede the basic symbol for the character with which they are associated as in the case of inhibitors.

5. Linkage groups and corresponding chromosomes will be designated by Arabic numerals.

6. Genic formulas will be written as fractions with the maternal alleles written as numerators. Each fraction will correspond to a single linkage group. Different linkage groups written in numberical sequence are separated by semicolons. Symbols of unlocated genes will be placed within parentheses at the end of the formula. In euploids and aneuploids the gene symbols will be repeated as there are homologous loci.

7. Chromosomal abberations will be indicated by abbreviations:

    Df for deficiency
    Dp for duplication
    In for inversion
    T for translocation
    Tp for transposition

8. The zygotic number of chromosomes will be indicated by 2n, the gametic number by n, and the basic number by x.

9. Symbols of extra-chromosomal factors will be enclosed within brackets and will precede the formula.

10. Genes found in diploid and tetraploid oats will not be cataloged separately. (This subject is not covered by the International Rules)

Copies of manuscripts of the chapters in the Oat Monograph dealing with inheritance in oats were kindly loaned to the committee by their respective authors. The information in these chapters was used as the basis for designating symbols for characters (and genes), following the rules listed above, shown in Table 1. At this time these symbols are purely tentative and should be regarded only as a starting point from which to deviate. Some of them, especially those dealing with characters where the mode of inheritance is uncertain, may be unnecessary. Additional symbols can be added as other characters are studied and new genes are found. The first column of symbols in Table 1 was constructed, with the idea of eliminating any chance of ambiguity, by means of allotting each basic term a distinctive symbol. (See rule 1 (a) above and Table 2) Thus L always means leaf and never means lemma (Le), ligule (Li), length (lt), or lodging (Lo). This scheme results in numerous 4-character symbols. The number of 4-character symbols could be reduced appreciably, for the time being at least, by stipulating only that each symbol be distinct within itself from all the other symbols as shown in the second column of symbols in Table 1 (rule 1 (b) above). For example L might stand for leaf in the symbol for leaf width (Lw) and for lemma in the symbol for lemma color (Lc).

The next step would be cataloging known genes, and assigning them symbols from a list similar to one of those in Table 1. The committee feels that it would be desirable to include as many as possible of the genes that have been reported in the literature over the years. In some cases this would be relatively simple, but in others it would be very complicated. There have been, for example, perhaps 30 genes reported that govern crown rust reaction. Certain morphological characters are almost as bad. It is often difficult or impossible to determine the relationships of genes reported at different places in the literature. However, once these have been straightened out, by arbitrary decision or otherwise, the cooperation of all investigators with some sort of permanent central committee should assure the orderly cataloging of all genes discovered in the future.

W. M. Myers
F. L. Patterson
E. G. Heyne
Neal F. Jensen
Marr D. Simons, Chr.

Table 1. Suggested symbols, under alternative schemes (a) and (b), for certain genes and characters of oats that have been studied genetically.

No.	Symbol (for dominant) (a)	(b)	Character
1.	A	A	Awnedness
2.	AP	Ap	Awn pubescence
3.	B	B	Blast
4.	ClD	Cd	Chlorophyll deficiency
5.	CR	Cr	Crown rust reaction
6.	Do	D	Dormancy (of seed)
7.	FDi	Fd	Floret disjunction
8.	Fl	F	Fluorescence (ultraviolet)
9.	Ht	Ht	Height (dwarfness)
10.	H	H	Hull-lessness
11.	KP	Kp	Kernel pubescence
12.	LP	Lp	Leaf pubescence
13.	LW	Lw	Leaf width
14.	LeCo	Lc	Lemma color
15.	LeP	Lpu	Lemma pubescence
16.	LiTy	Lt	Ligule type
17.	Lo	Lo	Lodging
18.	M	M	Maturity
19.	NP	Np	Nodal pubescence

Table 1. (Cont'd)

20.	PaSh	Ps	Panicle shape
21.	RaLt	Rl	Rachilla length
22.	RaP	Rp	Rachilla pubescence
23.	Sm	Sm	Smut reaction
24.	SpSe	Ss	Spikelet separation
25.	SR	Sr	Stem rust reaction
26.	StCo	Sc	Straw color
27.	T	T	Tillering
28.	VBl	Vb	Victoria blight reaction
29.	WaLe	Wl	Waxy lemma

Table 2. Symbols assigned to basic terms as stipulated by rule 1 (a)

No.	Symbol	Term
1.	A	Awn (edness)
2.	B	Blast
3.	Bl	Blight (reaction)
4.	Cl	Chlorophyll
5.	Co	Color
6.	C	Crown (rust reaction)
7.	D	Deficiency
8.	Di	Disjunction
9.	Do	Dormancy (of seed)
10.	F	Floret
11.	Fl	Fluorescence (ultraviolet)
12.	Ht	Height (dwarfness)
13.	H	Hull-lessness
14.	K	Kernel
15.	L	Leaf
16.	Le	Lemma
17.	Lt	Length
18.	Li	Ligule
19.	Lo	Lodging
20.	M	Maturity
21.	N	Node (nodal)
22.	Pa	Panicle
23.	P	Pubescence
24.	Ra	Rachilla
25.	R	Rust (reaction)
26.	Se	Separation
27.	Sh	Shape
28.	Sm	Smut (reaction)
29.	Sp	Spikelet
30.	S	Stem (rust reaction)
31.	St	Straw

Table 2. (Cont'd)

32.	T	Tillering
33.	Ty	Type
34.	V	Victoria
35.	Wa	Waxy
36.	W	Width

APPENDIX I. Rules for Symbolization Recommended by the International Committee on Genetic Symbols and Nomenclature

1. In naming hereditary factors, the use of languages of higher internationality should be given preference.

2. Symbols of hereditary factors, derived from their original names, should be written in Roman letters of distinctive type, preferably in italics, and be as short as possible.

3. Whenever unambiguous, the name and symbol of a dominant begin with a capital letter and those of a recessive with a small letter.

4. Literal or numeral superscripts are used to represent the different members of allelic series.

5. Standard or wild type alleles are designated by the gene symbols with + with + as a superscript or by + with the gene symbol as a superscript. In formulae the + alone may be used.

6. Two or more genes having phenotypically similar effects are designated by a common basic symbol. Non-allelic loci (mimics, polymeric genes, etc.) are distinguished by an additional letter or Arabic numeral either on the same line after a hyphen or as a subscript. Alleles of independent mutational origin may be indicated by a superscript.

7. Inhibitors, suppressors and enhancers are designated by the symbols I, Su and En, or by i, su and en if they are recessive, followed by a hyphen and the symbol of the allele affected.

8. Whenever convenient, lethals should be designated by the letter l or L, and sterility and incompatability genes by s or S.

9. Linkage groups and corresponding chromosomes are preferably designated by Arabic numerals.

10. The letters X and Y are recommended to designate the sex chromosomes.

11. Genic formulae are written as fractions with the maternal alleles given first or above. Each fraction corresponds to a single linkage group. Different linkage groups written in numerical sequence are separated by semicolons. Symbols of unlocated genes are placed within parentheses at the end of the

formula. In euploids and aneuploids the gene symbols are repeated as many times as there are homologous loci.

12. Chromosomal aberrations should be indicated by the abbreviations: Df for deficiency, Dp for duplication, In for inversion, T for translocation, Tp for transposition.

13. The zygotic number of chromosomes is indicated by 2n, the gametic number by n and the basic number by x.

14. Symbols of extra-chromosomal factors should be enclosed within brackets and precede the genic formulae.

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II. ARTICLES OF SPECIAL INTEREST

*** The 1959 Oat Crop ***

H. C. Murphy, (U.S.D.A.)

The 1959 oat crop will be remembered in many areas as the "barley yellow dwarf year." This virus disease was the most destructive disease affecting oats in the United States in 1959. It caused losses in certain portions of the heavy-oat-producing North Central Region fully equal to those sustained during the worst crown rust and Victoria blight years. Other regions, such as the Pacific Northwest, also experienced heavy losses in important oat producing areas. Fortunately, the heavy epiphytotic areas of barley yellow dwarf (BYD) were not as widespread on oats, nor did the disease cause as great a total loss, as some previous epiphytotics of the rusts, smuts, and Victoria blight. More widespread epiphytotics of BYD in earlier years, such as 1907 and 1949, probably caused greater total loss than in 1959. On the basis of past history and our available resistance, we would expect that crown rust and other major diseases may represent a greater threat to the 1960 and succeeding oat crops than does BYD.

A few recommended oat varieties were observed to possess appreciable resistance to BYD. Among the more outstanding were varieties such as Newton, Tonka (Early Clinton), Putman, and certain Fulghum types. Oat varieties, selections, and species previously found to be resistant by C. A. Suneson, R. M. Endo, C. M. Brown, and D. C. Arny were rather consistent in being outstanding for resistance at all locations. Several programs on breeding for resistance to BYD are under way, or being initiated, and significant progress already has been made at a few locations.

The 1959 epidemic of barley yellow dwarf on oats in the United States and Canada is thoroughly reviewed in Supplement 262 of the Plant Disease Reporter, published December 15, 1959. The 69-page Supplement contains 27 articles and a complete bibliography on BYD. The aphid vector and its control, varietal reaction and sources of resistance to BYD, effect of BYD on yield and other agronomic characters, estimates of losses sustained, and additional information, are presented in the Supplement. Copies of the Supplement have been sent to the mailing list given in the 1958 Oat Newsletter. Additional copies are available upon request.

The 1959 oat crop of 1,073,982,000 bushels, as reported by the Agricultural Marketing Service, was the smallest since 1939. It was produced on 28.5 million acres, the smallest harvested acreage since 1892. The average yield of 37.7 bushels per acre was 6.8 bushels below the record 45.5 yield obtained in 1958, but above average. Planting conditions were unfavorable in some areas resulting in poor stands, and severe drought conditions were present later in the season in restricted areas. Even so, prospects appeared to be good for a bumper oat crop until barley yellow dwarf became evident. In fact, near record farmer yields were reported in many yellow-dwarf-free fields and areas in a number of the States where the over-all yields were greatly reduced by BYD. The test weight and quality of the 1959 oat crop were generally good and above expectations. Oat diseases, other than BYD, caused only minor losses nationwide.

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*** International Cooperation Plus Breeding Pays Off in Oats ***

Franklin A. Coffman

Frequently examples of the benefits derived from international cooperation are cited. Likely in no field are the advantages more evident than in plant improvement, and among major crops are they more striking than in oats.

Thirty years ago one frequently heard oats referred to rather disparagingly as "just oats." In the last 3 decades a marked change has resulted. Whereas much publicity has been given the change in corn yields resulting from hybridization, comparatively little notice has been accorded the change in oats which has also been spectacular. For example, a comparison of average figures on oats in the United States for the two 5-year periods 1924-28 and 1954-58 would be as follows:

Period		U.S. Total Acreage (acres)	U.S. Total Production (bu.)	U.S. Acre Yld. (bu.)
1924-1928		41,886,000	1,277,755,000	30.5
1954-1958		35,996,000	1,358,472,000	37.8
Difference	total	-5,890,000	+80,717,000	+7.3
	Percent	-14.6	+ 6.3	+23.9

The monetary value of this 6.3 percent increase is about 60 million dollars.

The difference in yield is roughly equivalent to some 23,100 cars of oats (2550 bushels per car). This is sufficient to make a train extending from Chicago to north of Wisconsin Dells or from St. Louis to Greencastle, Ind. Area wise, the acreage cropped to oats has been reduced by some 9,375 square miles. That is about equal to the state of New Hampshire with the District of Columbia thrown in; one sixth the size of the state of Iowa or all of Minnesota south of an east-west line passing through St. Paul.

The reason for this increase in oats is unlike that in corn which has been tremendously influenced by much heavier application of fertilizers, by use of improved tillage methods, and still more growing of corn on primarily only the most productive soils due to acreage allotments. The increase in oat yields has not been the result of any such factors, although some shift in acreage has resulted from the increased use of winter oats for pasturage purposes. The return from the latter is not calculated in the $60,000,000 higher return from oats, although it doubtless would amount to additional tens of millions of dollars annually. In growing oats, there has been no appreciable change in fertilizer applications, cultural methods, shifts in acreage sown, nor harvest methods other than the use of the combine instead of the binder. Hence, the increase in oat yields must be assigned primarily to improved varieties, and credit must be given to the oat breeders of the United States, who have been able to produce these varieties because of international cooperation.

Four or five oat introductions are primarily responsible for the change. Not one of these varieties was of any value as an agricultural variety in North America, but the genes they carry when incorporated through hybridization into adapted varieties resulted in this revolution in oats. Except for Bond, introduced from Australia, all of the others; Victoria, Landhafer, and Sata Fe were received from South America. Victoria carries genes for increased vigor, Bond for stiff straw and higher test weight, but none of the others have so far been found to possess any especially desirable factors other than disease resistance.

Oat breeders during much of the past 3 decades have devoted their attention primarily to breeding for disease resistance, particularly resistance to crown rust. They have, however, been fully cognizant of other advantages derived, such as better standing ability and improved test weight in oats as the result of using Bond, and increased vigor from use of Victoria. However, they have been less aware of the fact that resulting from the accumulation of genes from many widely separated areas, the actual yield potential of their productions were probably being increased over that of oats grown 3 decades ago. A striking example of this attainment recently became evident.

Some years ago this writer crossed a white-kerneled awnless, stiff-strawed derivative from his previous cross (Wintok x Clinton^2 - Santa Fe) x Improved Garry, with /(Bonda x Haj.-Joan)-Santa Fe x Mo. 0-205/. Marked segregation resulted and in 1958 at Aberdeen, Ida. one family, with white kernels, and medium-tall, especially stiff straw, appeared unusually vigorous and outstanding for all observable agronomic characters.

Seed of 17 sister strains was sown in replicated yield rows at Aberdeen in 1959 and because almost all seed had been retained at Aberdeen, in short observational-type seedings at Beltsville, Md., Morgantown, W.Va. and Columbus, Ohio.

Yields from the observational seedings were such as to indicate these oats had considerable yield potential, but areas sown were too limited to be considered seriously. However, at Aberdeen the yields obtained appeared to border on the phenomenal and seed of most of these oats will be available for wide testing in 1960. The yields recorded at Aberdeen, Ida. in 1959 were as follows:

Selection	Yield B/A	Selection	Yield B/A
2780	241.2	2782	215.0
2785	240.7	2789	214.1
2790	237.7	2776	210.9
2784	237.0	2777	201.0
2774	232.7	2787	197.6
2778	231.0	2773	196.9
2783	227.0	2781	189.3
2779	223.2	2786	183.2
2788	222.2		
		Average	217.7 bu.
		Overland C.I. 4181(check)	175.8 "
		Difference	41.9 "

Records assembled over 10 years on uniform regional experiments conducted on irrigated stations in the Northwest indicate that of the some 2500 to 3000 individual station years' data on yield reported, only 3 or about 0.1 percent exceeded 200 bushels per acre. These figures indicate just how unusual this group of selections appears to be so far as yield potential is concerned.

Investigation of the sources of the parents entering these oats indicated a total of 23 varieties originating in different areas of the world as follows:

North America	United States and Canada
South America	Argentina and Uruguay
Europe	Sweden, Germany, Russia, France and the Mediterranean area
Africa	Algiers, Union of South Africa
Australia	New South Wales

Among the 27 varieties comprising the parental background of these oats, both *Avena sativa* and *A. byzantina* varieties were included, as well as winter and spring oats. Probably the fact that winter oats are included is worthy of special mention. This writer has long considered that where earliness was not a critical consideration winter oats because of their vigor and tillering capacities might well offer a prospect for increasing yield potential in spring oats through hybridization.

In this cross except for oats with black lemmas, varieties having practically every known character present in hexaploid oats are included. It is, of course, too much to expect that these oats contain anywhere near the complete array of these characters, but it does seem apparent they do include many favorable growth genes obtained from varieties adapted to widely separated parts of the world. As a consequence, it would appear evident that International

Cooperation is paying off, not only in our struggle to breed disease-resistant oats, but also in increasing the yield potential of our oats.

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*** Physiologic Races of Puccinia graminis var. avenae *** in the United States in 1959

D. M. Stewart,[1] R. U. Cotter,[1] and B. J. Roberts[2]
Cooperative Rust Laboratory

Ten physiologic races and subraces of oat stem rust were identified in the Cooperative Rust Laboratory at St. Paul, Minnesota, in 188 rusted samples from 20 States (Table 1). Among the 221 isolates identified, race 7 (combined with 12) was first in prevalence for the tenth consecutive year and increased from 54 percent in 1958 to 59 percent in 1959. Subrace 7A comprised 11 percent of the isolates, an increase of about 6 percent from the previous year. Race 8 (combined with 10) decreased from 26 to 11 percent. Race 6 (combined with 13) increased from 1 to 11 percent. Race 2 (combined with 5) was identified in 6 percent of the isolates, a decrease of about 8 percent.

Race 6 (with 13), which is virulent on the Richland and White Tartar derivatives, increased in distribution from 3 States in 1958 to 7 States in 1959, as follows: Indiana, Iowa, Minnesota, New York, North Dakota, Pennsylvania, and South Dakota. Of the 20 isolates identified of this race group, 13 came from rusted grain and grasses near barberry in New York.

Subrace 7A, which can attack oat varieties with the so-called Canadian type of resistance at both low and high temperatures, extended its distribution eastward to Pennsylvania and New York.

The virulent subrace 13A, first identified in 1957 in New York, was found twice near barberries in New York in 1959 and once in Michigan.

Table 1. Physiologic races of oat stem rust in the United States in 1958 and 1959

	Percentage of isolates	
Race	1958	1959a/
2 and 5	14	6
6 and 13	1	11
7 and 12	54	59
7A	5	11
8 and 10	26	11

a/ Preliminary results as of December 23.

1/ Plant Pathologists, Plant Pest Control Division, Agricultural Research Service, United States Department of Agriculture.
2/ Plant Pathologist, Crops Research Division, Agricultural Research Service, United States Department of Agriculture.

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*** Puerto Rico Oat Rust Nurseries ***

H. C. Murphy and F. M. Porter, USDA

The presence on the North American Continent of extremely virulent new races of oat rust, such as 264 of crown rust and 13A of stem rust, emphasizes the importance and value of the oat rust testing facilities now made available by the Federal Experiment Station, Mayaguez, Puerto Rico, and by Substations of the Puerto Rico Agricultural Experiment Station. The Crops Research and the Territorial Experiment Station Divisions, Agricultural Research Service, U. S. Department of Agriculture are cooperating in this recently expanded program. Dr. Thomas Theis, Assistant Officer in Charge, and Dr. Donald V. McVey, pathologist, Federal Experiment Station, Mayaguez, Puerto Rico, are administering the Puerto Rico phase of this program. The over-all wheat and oat rust testing program in Puerto Rico is coordinated by Dr. Louis P. Reitz, Crops Research Division, Beltsville, Maryland. All seed is assembled and data summarized and distributed from Beltsville. The primary objective of the Puerto Rico rust testing program is to enable breeders and pathologists to obtain field reactions to virulent races without incurring the danger of disseminating these races if they were used in their local nurseries.

The Puerto Rico oat rust testing program was expanded for the 1958-59 season as a result of the successful 1957-58 crown rust race 264 test. A stem rust race 13A nursery and crown rust races 290 and 216 nurseries were grown in 1958-59, in addition to the race 264 nursery. A total of 18 cooperators representing 8 States, Brazil, Canada, and Israel participated. Data from the 264 nursery were distributed to individual cooperators as soon as it was received at Beltsville. The data obtained from the oat rust nurseries were compiled by F. M. Porter and distributed to all cooperators who submitted entries. A number of entries exhibited satisfactory resistance to one or more of the races. Copies of this compilation are available.

The decision to use crown rust races 264 and 290, and stem rust race 13A, in the 1959-60 nurseries was based upon the requests received from U.S. and Canadian oat workers. A total of 24 oat breeders and pathologists representing 16 States and Canada responded to the memorandum informing them about plans for the 1959-60 Puerto Rico rust testing program. The data from the 1959-60 nurseries will be distributed to individual cooperators as soon as it is received at Beltsville. No over-all compilation of data is planned for this season.

Approximately 25,000 rows of wheat and oats are being grown at four locations in the 1959-60 Puerto Rico rust nurseries. The combined nurseries have reached their maximum size with the personnel and space now available. It is hoped that by adjusting the balance between wheat and oats, and limiting the number of races (locations), the needs for both crops can be satisfied.

During the 1957-58, 1958-59, and 1959-60 seasons, the oat rust nurseries in Puerto Rico have been grown at one or more of the following locations: Isabela, Lajas, Mayaguez, and Ponce. A given location has not necessarily been used for the same race each year. Cooperators submitting entries, States or Countries participating, and rows grown in each nursery, for the three seasons have been as follows:

	1957-58	1958-59	1959-60
Cooperators participating	17	18	25
States or countries represented	13	12	16
Approximate number of rows:			
Crown rust race 264	4800	4800	5700
Crown rust race 290	--	1200	5000
Crown rust race 216	--	600	--
Stem rust race 13A	--	540	1900
Total	4800	7140	12600

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*** Segregates from Cross, Black Mesdag x Ab. 101 (C.I. 7232) *** appear resistant to BYDV at Aberdeen, Ida. in 1959.

Franklin A. Coffman

Complete fertility in F_1 and later generations was obtained in progeny of the apparent hexaploid x derived tetraploid cross, X57BL: Black Mesdag x (Ab. 101: C. I. 7232). Tests made by Drs. M. B. Moore and Francis K. S. Koo at St. Paul, Minn. and by Dr. Harold G. Marshall at State College, Penna. as reported by Coffman[1/] indicated that the resistance to crown rust races 263, 264, 274 and 294 present in Ab. 101, was found in seedling derivatives of this cross.[2/] None of the lines were inoculated with spores of all of these 4 races of crown rust, but many were inoculated with races 263, 274, and 294 at St. Paul and one F_3 line was reported as being resistant to all three races.

Because the greenhouse at Beltsville, Md. was sprayed with certain insecticidal sprays, which control crown rust, crown rust could not be produced in 1958-59, and no information on the rust resistance of oats from this cross could be obtained at Beltsville. Although to date no resistance to stem rust has been noted in progeny of this cross, the progeny appeared to segregate for resistance to that Barley Yellow Dwarf Virus present and damaging throughout the oat nursery area at Aberdeen, Ida. in 1959. At Aberdeen, Black Mesdag appeared extremely susceptible to the BYDV present, whereas, Ab. 101 appeared to be resistant.

Space at Aberdeen did not permit seeding all the numerous lines from this cross and so the dark-kerneled oats were not sown. A total of 144 F_4 lines, derived from F_3 strains, having light-colored kernels, was grown at Aberdeen, in 1959. Observations were made on these lines as to their apparent resistance or susceptibility to the BYDV present which had resulted from natural field infection. Among these 144 lines, 13 did not appear to be infected by the disease, 61 appeared heavily infected, and of the other 70 lines, 39 were recorded as having light infection and 31 moderately-heavy infections.

The 144 F_4 populations grown at Aberdeen were derived from seed from 47 F_3 lines grown in the Beltsville greenhouse in 1958-59. The progeny of 14 of these 47 F_3 lines produced only heavily infected F_4 plants; 27 additional produced lines that ranged from heavy infection to no infection, 4 produced only populations that had light infections, and 2 produced lines with light or no observable infection. The data would indicate that probably 2 or more factors for resistance to this BYDV were involved in the cross Black Mesdag x Ab. 101.

Seed of these 144 lines has been planted in a growth chamber at Beltsville this winter. The plants are being inoculated with spores of crown rust race 264, supplied by Dr. Marr Simons, Ames, Iowa. These plants do not appear to be affected by the insecticides being used as sprays in the greenhouse. It is extremely interesting that certain of these lines that appeared to have some resistance to BYDV at Aberdeen are also proving to be resistant to crown rust race 264. Such lines are of special interest for crossing purposes and some seed from lines that appear resistant to both crown rust 264 and the BYDV, present at Aberdeen is available if anyone is interested.

1/ Coffman, Franklin A. Black Mesdag, A Possible Parent for Oat Species Crossing. Plant Disease Reporter. Vol. 43, No. 7, July 15, 1959: 5 p illus.

2/ Recently F. J. Zillinsky of Ottawa, Canada indicated to this writer that he also has found resistance to crown rust race 264 in progeny of this cross.

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*** The Rise of Private Grain Breeding in the United States ***

by N. F. Jensen and A. A. Johnson, Ithaca

Within fifteen years a small but increasing portion of the commercial oat acreage of the United States will be sown to varieties developed outside of publicly-supported research agencies. This prediction, opinion only, is nevertheless supported by a number of seemingly unrelated forces which taken together suggest such a trend is underway and will not be halted short of a thorough testing of the commercial potentialities.

There are historical precedents to serve as cornerstones for the further growth of private plant breeding with cereals in the United States. The traditional public development of crop varieties in the United States is a growth pattern quite different from that found in parts of Europe and the Scandinavian countries, where privately developed varieties share the commercial seed market with publicly-developed varieties. Even in parts of the United States, principally the Southeast, private development of grain varieties has existed and prospered since the beginning of grain improvement.

During the past two decades the interest in private development and commercial exploitation of agricultural crops, poultry and livestock has created sound research staffs and scientific environments in private industry. The rapid rise of corn, chicken, and hog hybrids is well known. The unique advantages of inbred lines were, of course, the underlying reasons for the commercial successes of research in these areas. More recently, the crop areas of interest to commercial breeders have been widened to include other cross-pollinated crops, as witness recent interest in tetraploid rye and forage crops (alfalfas). Here, where seed stocks cannot be controlled indefinitely, as through sole possession of inbred lines, protection has been sought through propagating arrangements with the originating (private) breeder and by other means. This entire new activity is currently being studied by private and public interests consulting together, and encouraging steps are being taken to bring these fast-moving new crops under existing agencies (e.g. certification) for the protection and benefit of the consumer and breeder.

Can one doubt but that this trend will reach also to the small grains? The time seems ripe for this extension. Minds are alert to change and there is an appreciation and searching for new products in the seed world and new efficiencies of operation. Sufficient background experience with present crops has accumulated. Some private establishments have research staffs and facilities as competent as their counterparts in public research institutions. In addition there exists an organizational framework with sales force and sales outlets. Some firms have the requisite size to absorb the developmental costs inevitable in a crop breeding program. In short, such a program with oats appears to be economically sound.

Seed oats are an important commercial seed item in which there is, unfortunately, little profit. Price competition is great and operating margins small. Nevertheless, because of this item's relation to the overall seed business many seed firms cannot afford to not sell oats, even if at a loss. Always in the background is a tantalizing volume market -- 2 to 3 bushels per acre for X million acres needed by farmers every spring and fall. The tempo of farming has drastically changed, too, as plant breeders well know. We cannot produce improved varieties fast enough to satisfy changing environmental conditions, not to mention the pen-up desire of farmers for the new. Consider then what must be the value of a new good oat variety which is the exclusive property of a private firm of good reputation. The problem which faces private enterprise with the self-pollinated cereals is how to develop and maintain a proprietary equity in the seed stocks sufficient to assure 1) recovery of their development costs, and 2) a reasonable profit. If the value of a new self-pollinated variety is dependent solely on a huge initial release of seed it is not certain that these aims can be accomplished. Costs of development and reasonable profit margins need not raise per bushel seed costs to the farmer excessively and an important factor from the standpoint of the originating firm is that costs and selling prices could be on the variety's merit rather than set solely by competitive pressure. This is not necessarily unfavorable to the seed user. There is no reason why high quality seed should not command its hire in the market place. In fact, if oat seed prices were based realistically on costs of production and processing they would most certainly need to be raised. While almost all other costs of farm production have risen markedly, post-war, it is a fact that seed grain prices have risen little at all.

If you will generously grant the assumption that there is such a trend underway towards the greater participation of private enterprise in cereal breeding the question then arises, what changes will follow in its wake? More pertinently, what anticipatory movies ought to be made to maintain an orderly varietal testing and release policy? We would hesitate at this time to venture any opinions on this matter other than to establish the broad base that, if there is to be an increase in private grain breeding in the United States, it is highly desirable to all concerned that it proceed in cooperation with publicly-supported research. The dangers inherent in a two-standard approach are so obvious that they need only to be hinted at. Consider the public volnerability with dual control of rust organisms for testing; or again, consider the lack of protection to the public represented by an additional class of seed moving outside certification channels. Present procedures have been worked out over many years of trial and it would seem that the greater burden would rest upon private enterprise in adapting its activities to this framework. On the other hand it may well be that the answer to the private breeders dilemma with seed of a self-pollinated pure line crop lies in an approach to ceftification. A responsibility for taking the lead in extending cooperation and coordinating policies would seem to lie heavily on the established public agencies because of their longer experience with these matters. Particularly, it would seem desirable to phrase and re-state the principles which have traditionally served as a code for the cooperative communication of thought and materials between scientists. Much give-and-take will necessarily be involved. Perhaps this subject is important enough to be given discussion time at a future oat conference.

It should be borne in mind that mutual advantages and the welfare of the farmer are at stake and can best be served by a cooperative approach. Commercially successful private breeding programs will result in more plant breeders (private and public) devoting their efforts to grain variety improvement. This opens the prospect of increased attention to basic research by the public agencies to be carried concurrently with their oat breeding programs.

A word in passing as to why we have singled out oats as the crop which will first receive the attention of private breeding. We believe the quality considerations (malting for barley, milling for wheat) make oats the obvious choice and the one crop with the broadest market. This is not to say that a parallel development might not take place in these other crops.

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*** A List of Oat Varieties and Selections Resistant to Stem Rust ***

H. C. Murphy, USDA

A number of oat workers have requested a list of named oat varieties and selections, including their parentage and genotype, for stem rust reaction. The information presented herewith has been assembled from various publications and processed reports, especially the uniform oat rust nursery and uniform oat yield nursery annual reports. Most of the information was obtained by the USDA in cooperation with the Minnesota and Iowa Experiment Stations, and by workers in Canada and South America. Special credit should be given to B. J. Roberts, USDA plant pathologist, who in cooperation with the Minnesota Experiment Station, determined many of the genotypes listed. Additional biotypes of oat stem rust and genes for resistance are being investigated by various workers.

Table 1. Reaction in the seedling state of certain oat varieties to races of oat stem rust.

Variety	C.I. No.	Genes	Reaction to races 1	2	3	3A	4	4A	5	5A	6	7	7A	8	8A	9	10	11	12	13	13A
Richland	787	A	R	R	R	R	S	S	R	R	S	R	R	S	S	MS	S	S	R	S	S
Canuck	4024	BC	R	R	R	R	R	R	R	R	R	R	S	R	S	R	R	R	R	R	S
White Tartar	551	D	R	R	S	S	S	S	R	R	S	S	S	R	R	R	R	R	S	S	S
Jostrain	2660	E	R	S	R	R	R	R	MR	MR	S	S	S	S	S	S	MR	R	MR	MR	MR
LMHJA a/	7144	AD	R	R	R	R	S	S	R	R	S	R	R	R	R	R	R	R	R	S	S
Garry	6662	ABC	R	R	R	R	R	R	R	R	R	R	R	R	S	R	R	R	R	R	S
Burnett	6537	BCD	R	R	R	R	R	R	R	R	R	R	S	R	R	R	R	R	R	R	S
LMHJA a/	6909	ABCD	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	S
Saia	4639	--	R	R	R	S	R	S	R	S	R	R	R	R	R	R	R	R	R	R	R

a/ LMHJA = /Landhafer x (Mindo x Hajira-Joanette)/ x Andrew

The genotype for reaction to stem rust, C.I. number and registration number of some named oat varieties and certain unnamed selections used as parents are listed below:

Genotype	C.I. No.	Reg. No. 1/	Variety or cross
ABCD	7148	-	AB-110: /Haj-Joan x Bond-Rainbow) x Santa Fe/ x Southland
Abcd	4970	-	Abegweit: Vanguard x Erban
abcD	3845		Advance: D69 x Bond
Abcd	4157	162	Ajax: Victory x Hajira
A*BCd	5371	133	Alamo: (Victoria x Hajira-Banner) x (Fulghum x Victoria)
Abcd	4170	113	Andrew: Bond x Rainbow
abcD	2143	75	Anthony: White Tartar x Victory
Abcd	4608	-	Beacon: (Gold Rain-Alaska) x (Legacy-Victoria)
Abcd	4521	-	Beaver: Vanguard x Erban
Abcd	6752	-	Beedee: Beacon x Hawkeye-Victoria
abcD	6930	147	Bentland: Benton^7 x Landhafer
abcD	3910	106	Benton: D69 x Bond
abcD	4329	108	Bonda: Bond x Anthony
abcD	5401	-	Bondvic: Anthony-Bond x Boone
abcD	4676	161	Bonham: D69 x Bond
Abcd	3305	87	Boone: Victoria x Richland
Abcd	5013	-	Branch: Forward^2 x Victoria-Richland

1/ Descriptive articles for varieties registered by the American Society of Agronomy have been published in the Agronomy Journal.

* Heterozygous reaction for this gene.

Genotype	C.I. No.	Reg. No.	Variety or cross
aBCD	6537	140	Burnett: (Victoria x Hajira-Banner) x Colo
aBCd	4024	-	Canuck: Hajira x Joanette
Abcd	3314	103	Cedar: Victoria x Richland
abcD	3846	114	Cherokee: D69 x Bond
Abcd	5647	163	Clarion: Clinton x Marion
abcD	5869	-	Clintafe: Clinton^{3} x Santa Fe
abcD	6701	148	Clintland: Clinton 59^{4} x Landhafer
aBCD	7234	-	Clintland 60: C'land^{2} x /(C'ton 59^{7} x Landh)^{4} x (C'ton x Boone-Cartier x RL 3105)/
ABCD	7457	-	C'land^{5} x /Land x (Mindo x Haj-Joan)/ x Andrew
ABC*D	7451	-	C'land^{5} x /Land x (Mindo x Haj-Joan)/ x Andrew
ABCd	7269	-	Clintland x (Garry x Hawkeye-Victoria)
abcD	3971	105	Clinton: D69 x Bond
abcD	4259	-	Clinton 59: D69 x Bond
abcD	3972	-	Colo: Hancock x Morota-Bond
ABCd	7272	-	Columbia-Marion x /(Victoria x Haj-Ban) x (Victoria x Haj-Ajax)/
Abcd	3603	-	Control: Victoria x Richland
abcD	6572	149	Dubois: Clinton x Forkedeer
abcD	4672	154	Dupree: (Anthony-Bond) x (Richland-Fulghum)
Abcd	3908	109	Eaton: Iogold x Bond
Abcd	4158	-	Exeter: Victory x Rusota
Abcd	6916	-	Fayette: Vicland x (Branch x C'ton^{2}-Santa Fe)
Abcd	5226	-	Frotune: Victory x /(Victoria-Richland) x (Markton-Victory)/
Abcd	4164	-	Forvic: Forward x Victoria-Richland
Abcd	7288	-	Fundy: Ajax x Abegweit
ABCd	6662	164	Garry: Victory x (Victoria x Hajira-Banner)
ABCd	7266	-	Goodfield: Clintland x (Garry x Hawkeye-Victoria)
abcD	1892	38	Green Mountain
Abcd	2893	18	Green Russian
Abcd	3346	88	Hancock: Markton x Rainbow
aBCD	3030	-	Hull-less HA-14
Abcd	7292	138	Indo: (Victoria-Richland x Fulghum) x Palestine^{5}
Abcd	2329	72	Iogold: Selection from Kherson
Abcd	5441	159	Jackson: Clinton x Marion
abcD	5015	155	James: Bond x /Minota-White Russian) x Black Mesdag/) x Nakota
abcD	3909	-	Kent: D69 x Bond
A*bcD*	1209	-	Kherson (original)
Abcd	2721	-	Kherson
aBCd	3037	-	Kherson No. 27
abcD	3038	-	Kherson Sel. 99
abcD	2692	-	Lampton: (Abrizzes x Victory) x Reids
AbcD	7144	-	/Landhafer x (Mindo x Hajira-Joanette)/ x Andrew

Genotype	C.I. No.	Reg. No.	Variety or Cross
ABCD	7145	-	/Landhafer x (Mindo x Hajira-Joanette)/ x Andrew
abcD	4981	-	Lanark: Onward x Anthony-Bond
Abcd	6929	-	Logan: Benton x Marion
Abcd	6625	-	Macon: Columbia x Marion
Abcd	3247	89	Marion: Markton x Rainbow
abcD	4328	107	Mindo: Bond x /(Minota-White Russian) x Black Mesdag/
ABCd	6913	143	Minhafer: (Bond-Rainbow x Hajira-Joanette) x Landhafer
aBCD	6765	144	Minland: Landhafer x (Mindo x Hajira-Joanette)
abcD	2144	-	Minrus: Minota x White Tartar (White Russian)
aBCD	6935	-	Minton: /Landhafer x (Mindo x Hajira-Joanette)/ x Clinton
Abcd	4626	125	Mo. 0-200: Columbia x Bond-Iogold
AbcD	4988	126	Mo. 0-205: Columbia x Victoria-Richland
abcD	4327	127	Mohawk: Bond x D67
Abcd	2883	-	Nakota: Markton-Richland x Swedish Select - Kilby Hull-less
Abcd	7194	-	Nehawka: Cherokee reselection
abcD	4301	115	Nemaha: Victoria-Richland x Morota-Bond
Abcd	4141	112	Neosho: Fulghum-Markton x Victoria-Richland
Abcd	6642	151	Newton: Nemaha x (Clinton x Boone-Cartier)
Abcd	3991	111	Osage: Fulton x Victoria-Richland
Abcd	2886	98	Otoe: Burt selection
Abcd	4181	117	Overland: Victoria-Richland x Bannock
abcD	5636	-	Palomino: Andrew x Clinton
Abcd	6611	160	Park: Clinton x Overland^2
Abcd	7107	-	Portage: Ajax x (Harkeye-Victoria)
abcD	6927	152	Putnam: Boone-Cartier x Clinton
ABCd	7379	-	Radar 1: Victorgrain 48-93 x /(Bond-Rainbow x Hajira-Joanette) x Landhafer/
ABCd	7340	-	Radar 2: Victorgrain 48-93 x /(Bond-Rainbow x Hajira-Joanette) x Landhafer/
Abcd	2345	74	Rainbow: Green Russian selection
ABCd	5927	145	Ransom: Sac x Hajira-Joanette
Abcd	787	44	Richland: Kherson selection
aBCD	6661	166	Rodney: /(Victoria x Hajira-Banner) x Victory-Hajira/ x Roxton
abcD	3907	-	Sac: D69 x Bond
Abcd	5946	-	Sauk: (Forward x Victoria-Richland) x Andrew
Abcd	7203	-	Scotian: Vanguard x Erban

Genotype	C.I. No.	Reg. No.	Variety or Cross
abcD	3033	-	S.E.S. 42
abcD	3032	-	S.E.S. 49
abcD	3034	-	S.E.S. 52
ABC*d	7209	-	Shield: /Rox x (Victoria x Hajira-Banner)/ x /Ajax x (Victoria x Hajira-Banner)/
abcD	4372	118	Shelby: Anthony x Bond
Abcd	6767	167	Simcoe: Ajax x Erban
abcD	5207	131	Southland: D69-Bond x Fultex
Abcd	3502	99	Tama: Victoria x Richland
Abcd	7192	-	Tonka: Clinton selection
Abcd	3547	-	Vanguard: Hajira x Banner
Abcd	3989	-	Ventura: Fulton x Victoria-Richland
Abcd	4312	-	Verde: Red Rustproof x Victoria-Richland
ABCd	7291	-	Vicar: Garry selection
aBCD	4021	-	Victoria x Hajira-Banner
Abcd	3611	93	Vicland: Victoria x Richland
AbcD	3602	-	Vickota: Victoria x Richland
Abcd	5440	156	Waubay: Clinton x Marion
abcD	1537	-	White Russian
abcD	1614	42	White Tartar
abcD	4800	119	Zephyr: Bond x Anthony

III. CONTRIBUTIONS FROM OTHER COUNTRIES

*** AUSTRALIA - New South Wales ***

*** The Breeding of Frost Resistant Grazing Oats ***

by P. M. Guerin, New England
Experiment Farm, Glen Innes.

As in other parts of Australia, livestock are not housed during winter on the Northern Tablelands of New South Wales. The winter is usually a moderately dry season, characterised by moderate temperatures and brilliant sunshine during the day following nights of more or less severe frost. The average minimum temperature for July, the coldest month, is 32.7°F. while extreme temperatures down to 17°F. have been recorded. Under these conditions the growth of even improved permanent pastures is slow enough to warrant the sowing of an oat crop in early autumn for supplementary winter grazing.

The problem of frost damage is rarely very serious in the case of oat crops grown only for grain unless sowing takes place too early, or a mild winter is followed by severe spring frosts. Flag frosting is quite common in the case of autumn sown grain crops, but the really serious damage which results in the death of plants is mainly confined to grazing oats. Freezing temperatures upon freshly chewed or cut surfaces of the plants, whose succulent crowns are thereby exposed, cause mortality of the plants, the percentage of kill depending upon the hardiness of the variety tested.

The object of breeding is to evolve frost resistant oats of high grazing productivity and the capacity to recover a crop of hay or grain after several grazings. There are other associated problems of which straw weakness is an important one. The most productive grazing oat under these conditions is probably the variety Fulghum, a weak strawed oat, which has been used extensively for hybridizing with stronger strawed, rust resistant spring oats like Richland and Garry. A selection made by Carroll from the Victoria-Richland x Algerian x Fulghum cross effected by Macindoe resulted in the release of the comparatively stiff-strawed dual purpose oat named Acacia. As this useful variety lacks rust resistances and could be stronger strawed further breeding is in progress to remedy these deficiencies. A mass selection of Acacia x Lampton, W4537, is superior to Acacia in straw strength and grain yields over a wider area and is hardly inferior in powers of grazing or frost resistance. It has no resistances however to prevailing stem rust races and like Acacia does not possess Victoria crown rust resistance which is still effective in this region. A selection of Fulghum x Garry, W4597, possesses remarkable grazing productivity combined with high resistances to stem rust and smuts and is mid-season in maturity. Neither W4537 nor W4597, however are sufficiently large in grain size to be suitable for milling purposes. A selection of Victoria-Richland x Burke x Fulghum x Winter Fulghum, W4587, does however possess a suitably large grain with strong straw and apparent drought resistance. The 3 selections provide suitable material for crossing with a view to the requirements of this region.

Actual frost resistance and recovery after grazing have to be considered together in this breeding project and both appear to be closely related. The difficulty of attempting a study of winter hardiness inheritance lies in the wide differences in survival within both parental and segregating populations when planted at different times and in different seasons under natural conditions. There is some evidence to believe that a sowing as early as January or February (late summer) may result in some varieties like Fulghum receiving a pre-conditioning treatment which a normal autumn (March or April) sowing would not provide. This would suggest a response to temperature and/or photoperiod.

The measurement of hardiness is complicated by factors such as the length of the vegetative stage, and the depth to which the root system penetrates. Associated with hardiness is habit of juvenile growth and rate of growth, although they are not necessarily linked together. While fast early growing varieties-like Avon and Garry are very erect in habit and extremely susceptible to grazing injury at Glen Innes, the fast early growing Acacia is very resistant although it is rather prostrate. The fairly erect growing Fulghum is also resistant, although it is not particularly fast growing at the beginning of the season. Fulghum is probably the most productive grazing oat although it is otherwise inferior.

Although many hardy varieties like Algerian have very narrow leaves, some of them are surpassed both in hardiness and in width of leaf and grazing productivity by Acacia. Further advances are anticipated in this direction.

There are many difficulties concerning techniques which have yet to be solved. Yield trials under these conditions of severe grazing can exaggerate differences in what the yields of different varieties would be under normal farm conditions. The grazing measurement technique has been largely responsible for this accentuation, which however may be desirable for detecting small differences in power of recovery after grazing. Areas are samples for yield of green and dried material by cutting them with hand shears before turning sheep in to graze the remainder of the plots down to a common level close to the ground. The hand sheared areas are invariably more closely grazed than the remainder of the plots and suffer most from plant mortality depending on the hardiness of the variety tested.

In general there appears to be good scope for interesting and fruitful work on this aspect of breeding dual purpose oats for tableland conditions.

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*** CANADA ***

*** Cereal Crops Division, Ottawa ***

by F. J. Zillinsky and R. V. Clark

General Conditions:

Oat yields in Ontario and southwestern Quebec were generally lower than normal due to a prolonged drought during May and June. Seeding started a week to ten days earlier than usual in most regions. Losses from lodging, yellow dwarf and crown rust were relatively light and occurred in isolated areas. A heavy but very late epidemic of stem rust occurred in eastern Ontario, attacking all oat varieties including Garry and Clintland 60.

The varieties Glen and Fundy are the top yielding varieties in Quebec and the Maritime Provinces. Garry however continues to hold its own in Ontario and is probably the most popular variety in the province. Strain 5055-46 from cross (Garry-Mutica Ukraine) x Abegweit$_2$ has performed well in the Co-operative Oat Tests during the past three years. It is particularly well adapted to Ontario being the top yielding entry in Co-operative and Regional Tests in this province.

Lodging resistance investigations

A co-operative program to test oat strains for strength of straw was initiated in 1958. Sixty entries were tested at seven locations in 1958, and 80 entries at eleven locations in 1959. Test locations extended from Agassiz, B.C., near the Pacific Coast to Charlottetown, P.E.I., near the Atlantic. Entries were selected from material observed to have strong straw in breeding programs and also from varieties and introductions reported to havehigh resistance to lodging. Entries which had a high rating in 1958 were included in the 1959 tests. Named varieties with the best resistance to lodging in these tests were Milford and Palu. Among the best strains were Ott.-3932-16, (Beacon x Laurel); Ag. 50-250 (RL 1574 x Ripon); Ag. 13-11, Ag. 13-14 (Eagle x Holmberg) and Ott. 5243-8 (Shield x Garry-Klein).

Interspecific investigations

The progress in transferring genes for resistance to crown rust from diploid and tetraploid species to cultivated oats has been very encouraging. Resistance to 264 and other races of crown rust has been obtained in hexaploid progenies from crosses between a) tetraploid species x A. sativa; b) derived tetraploid forms x A. sativa; c) autotetraploids x A. sativa. Resistance to race 264 has not yet been found in fertile hexaploid progenies resembling A. sativa from crosses between the derived hexaploids (A. abyssinica x A. strigosa)^2 x A. sativa. Considerable time and effort has been devoted to crosses in the latter group. The main difficulty lies in the high degree of sterility among F_1 and F_2 plants in this cross and the number of families finally becoming fertile have been small.

Septoria Disease of Oats

Epidemiology studies at Ottawa on the Septoria disease of oats caused by the fungus Leptosphaina avenaria f. sp. avenaria (imperfect stage Septoria avenae f. sp. avenae) showed that ascospores were the principal cause of primary infection. Macrospores produced in the leaf lesions on oat plants were responsible for the secondary spread of the fungus and the subsequent development of the black stem phase of the disease. The purpose of the microspores was not clearly understood but they appeared to be of little importance in the initiation and subseqent spread of the disease. Viable ascospores were present in the field in early June, some 10 days to two weeks before the initial symptoms appeared and they remained plentiful throughout the growing season and provided the means for the widespread development of the disease. Seed-borne infection was found to be of no importance in the epidemiology of this disease in the Ottawa area.

For the past three years, field tests have been conducted at Ottawa with foliage fungicides to determine the losses to the oat crop because of the presence of the Septoria disease. Complete control of the disease has not been achieved. However, even with partial control the increase in yield from treated plots has been substantial indicating that this disease is of major importance in reducing the yield of the oat crop. The various chemicals used have shown a wide variation in their effectiveness. The Dithanes and Manzate have consistently appeared the best. Nickel compounds that are effective in controlling cereal rusts were found to be of little value for the control of Septoria on oats.

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*** Department of Agriculture Research Station, Winnipeg ***

by G. J. Green, B. Peturson, and J. N. Welsh

The oat rusts caused little or no damage in Western Canada in 1959. Stem rust was first found on July 23, much later than normal, and too late for extensive development. Crown rust was observed first on June 30 but it developed slowly and caused no important losses.

The most important feature of the stem rust race distribution was the re-appearance for the third consecutive year of races virulent on Garry and Rodney in eastern Ontario and Quebec. Races 8A and 13A have been found for three consecutive years, race 6A for two years and race 11A for the first time in 1959. The persistence of these races in Eastern Canada does not encourage the optimistic point of view that they may remain there, although races 6 and 13 which have been prevalent in that area for a number of years have not developed in the great plains region. The prevalence of race 7A continued to increase in 1959, but it has not yet caused significant losses to Rodney in Manitoba. Race 7 was the most common of the older races.

Oat crown rust races 213, 216, 274 and 279, which are virulent on the variety Victoria, a widely used source of resistance, increased in prevalence in Eastern and Western Canada. The increase has been greatest in Western Canada where they constituted 16 per cent of the isolates in 1956 and over 95 per cent of the isolates in 1959. Races 264, 276, 290, 293, 294 and 295, virulent on Landhafer, were not found in Western Canada in 1959, but in Eastern Canada they increased from 1 per cent of the isolates in 1956 to 20 per cent in 1959.

The varieties Garry and Ceirch dubach were crossed to combine the crown rust resistance of Ceirch dubach with crown rust resistance from Victoria, good stem rust resistance, and good agronomic characteristics possessed by Garry. The reaction of F_3 lines from this cross to seven races of crown rust, shown in the following table, indicate that the resistance of Ceirch dubach has been fully recovered in the progeny. The lines will be useful as breeding material to increase the crown rust resistance in commercial varieties.

Rust Reaction of F_3 Lines from a Cross Between Garry and Ceirch dubach to Three Victoria Attacking Races and to Four Landhafer Attacking Races.

Parents and F_3 Lines	Reaction of Crown Rust Races						
	216	274	279	276	290	293	294
Ceirch dubach	1	1	1	2	1	1	1
Garry	4	4	4	4	4	4	4
1	1	1	1	2	1	1	1
2	1	2	1	2	1	1	1
3	1	2	1	2	1	1	1
6	1	3	1	2	2	2	1
7	1	1	1	1	1	1	1
14	1	3	1	1	1	1	1
15	1	1	1	3	1	1	1
16	1	3	1	2	1	1	1
17	1	2	1	2	1	1	1
18	1	1	2	3-	1	1	1
19	1	1	1	2	1	1	1
20	1	2	1	3	1	1	1
21	1	1	1	3	1	1	1
22	1	1	1	1	1	1	1

Meaning of symbols: 1 = highly resistant; 2 = moderately resistant; 3 = moderately susceptible; 4 = highly susceptible.

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*** COLOMBIA ***

*** Oat Breeding in Colombia ***

John W. Gibler, Rockefeller Foundation, Bogota

At the present time there is very little oats grown in Colombia, not because there isn't a demand but rather there is no good adapted oat resistant to stem rust. There is a very large potential for oats as forage and silage and a steady demand for about 7000 metric tons of grain for human consumption. There is also a need for grain as livestock feed.

The breeding program started on a small scale in 1957 using material selected out of previous International Oat Rust Nurseries. The southern variety Sunland and the hybrid Andrew x Landhafer F.R.272 which were of excellent agronomic type but susceptible to stem rust were crossed with stem rust resistant lines.

The breeding program was greatly expanded in 1958. The world collection of the United States Department of Agriculture was screened for stem rust resistance and a selection from C.I.6969, Canuck x Florida 167-Landhafer was seeded in a 250 acre multiplication plot. A shift in stem rust races occurred and C.I. 6969 became completely susceptible. Two lines that were resistant in small plots-Santa Fe x Clinton[3], F.R. 318-2B and Osage x Bonda-Hajira Joanette/Santa Fe, C. I. 7167 were selected for multiplication in 1959. About 450 crosses were made.

In 1959 another shift in races occurred and the 2 lines F.R. 318-2B and C.I. 7167 became completely susceptible. From the 1131 lines selected out of the world collection only 93 were harvested. Over 150 F_1 crosses were discarded and many more are of doubtful value.

From rust collections made in 1959 races 7A and 13A have been tentatively identified. Firm identifications of the isolates must wait the installation of controlled temperature cabinets.

Table 1 lists the best sources of resistance from the world collection to the above races with reactions to stem rust in the field in 1958 and 1959. Table 2 lists the parentage of the advanced hybrids from the crossing program with the best resistance. Selection II-5-3t-2t from the cross Andrew-Landhafer x Sunland had the best resistance (10 MR) of any line or variety in the entire nursery in 1959. There were no lines with immune or completely resistant reactions.

Table 1. Varieties screened in the field in Colombia from the U.S.D.A world collection of oats with the best resistance to races 7A and 13A 1/ of stem rust of oats.

Variety	C.I. Number	Field Reaction 1958	Field Reaction 1959
Minhafer Selection	6913-Sel. 1t	--	40 MR-MS
Landhafer-Minto/Hajira Joanette x Clinton x X643-6 Wisc.	7092	--	50 R
Clintland x (X421-5-2 x Garry-Hawkeye/Victoria)	7260	50 MR	50 MR
Clintland x (X421-5-2 x Garry-Hawkeye/Victoria)	7377-Sel. 101t	--	30 MR
Clinton[2]-Arkansas x Clinton-Cartier	7246	50 MS-S	40 MR
Lampton	2692	40 MR	40 R-MR
Lampton Sib	3043	5 MR	30 R
Abundance	1970	10 MR	30 R-MR
Beacon	4608	10 MR	50 MR-MS
Vanguard	3547	20 MR	40 MR
Berry No. 333	4811	20 MR-MS	50 R-MR
Bond-DCB x Nakota	5330	30 MR-MS	50 R-MR
Branch-Spooner x Bond Double Cross	6795	10 MR	40 R-MR
Brazil	6691	20 MR	40 R-MR
Clinton x Forkedeer	6727	10 MR	50 R-MR

Table 1. (Cont'd.)

Variety	C.I. Number	Field Reaction 1958	1959
Green Mountain	3128	5 R	40 R-MR
(Landhafer x Bond/Rainbow x Hajira Joanette) x Andrew	7208	10 R	50 R-MR
Marion	3247	20 MR	40 MR-MS
Osage x (Bonda-Hajira Joanette x Santa Fe)	7170	20 MR-MS	35 MR
S.E.S. Selection No. 49	3032	5 MR-S	30 R-MR
S.E.S. Selection No. 42	3033	5 MR	20 MR-MS
S.E.S. Selection No. 52	3034	10 MR	20 MR-MS
X216-22X forvic	7102	T R	20 MR

1/ Tentative identifications.

Table 2. Advanced generation hybrids from the Colombian oat breeding program with the best field resistance to races 7A and 13A[1/] of stem rust.

Variety	Cross No.	Generation
Andrew-Landhafer x Sunland 2/	II-5	F5
Andrew-Landhafer x (Santa Fe-Clinton^3 xLandhafer-Mindo/Haj Joan)	II-7	F5
Andrew x Sunland	II-9	F5
(Santa Fe/Clinton-Sac/Hajira Joanette) x Sunland	II-13	F5
Andrew-Landhafer x Clinton/Landhafer-Rainbow/Bond	II-14	F4
Clinton-Landhafer x Canuck/C.I. 5919-Sunland/Missouri 811	II-18	F4
Clinton-Landhafer x Clinton/Landhafer-Rainbox/Bond	II-36	F4
Benton-Santa Fe x Canuck/C.I.5919-Sunland/Missouri 811	II-43	F4
Benton-Santa Fe x C.I. 6969	II-44	F4
Sac-Hajira Joanette x Canuck/C.I. 5919-Sunland/Missouri 811	II-45	F4
Sac-Hajira Joanette x C.I. 6969	II-46	F4

1/ Tentative identifications.
2/ Selection II-5-3t-2t had a reaction of 10 MR, the best in the entire nursery including the U.S.D.A. world collection.

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*** JAPAN ***

by Takeshi Kumagai, Hokkaido National Agricultural Experiment Station

The growing season in 1959 was favorable for raising of oat plants in Hokkaido, the northern-most island of Japan. Climatic conditions allowed early planting and increased germination, although there were many cloudy days. Temperatures in the end of May were slightly lower than usual, but relatively fair weather prevailed in the later part of June. In general, oat plants, while growing, were favored with good climatic conditions and grew well. Extremely dry spells in July and August exerted good effects on maturation and safe harvesting, too.

The five leading varieties of oats grown in Hokkaido are: Zenshin, Victory No. 1, Hokuyo, Tanmi, and Kuromi No. 1. Among them, Zenshin is the highest (40% of the total) in production, followed by Victory No. 1.

Honami Oats Released

Honami (registered as Norin No. 2), a high yield variety with full heads, was released in the autumn of 1959 for raising in Hokkaido area. This was a selection from the cross of Kuromi ("Argushafer" in German) and Victory No. 1, a Japanese selected line from Victory.

Honami variety, when compared with Victory No. 1 is about 2 or 3 days earlier in heading time, and is 4 to 5 cm shorter in plant height. The panicle of Honami suppasses Victory No. 1 in the number of grains per panicle, but in grain size Honami is more or less inferior to Victory No. 1. The color of the kernel of Honami is whitish yellow. The grain yield of Honami is higher than that of Zenshin, one of the high yield varieties in Hokkaido. It is worthy to note that, when Honami is planted in poor soil it shows relatively high yielding capacity together with a superiority of straw stiffness, in spite of the low soil fertility.

Performance test of oat varieties from U.S.A.

In 1959, a performance test of oat varieties introduced from U.S.A. was conducted at the Hokkaido National Agricultural Experiment Station, Sapporo, Hokkaido. Seeds were drill-planted in rows 50 cm apart at the rate of 169 kernels per 1 square meter. Each plot consisted of 2 rows of 5 m length, and was arranged in a triple lattice design.

Agronomic characters observed were: date of germination, date of heading, date of ripening, culm length, panicle length, number of tillers, number of panicles, weight of plant, yield of straw, weight of grains, weight of grains per liter, weight of 1000 kernels, and hull percentages.

Among these, data of the heading date and the yield of grains are quoted in the following table:

Variety	Date of heading	Grain Yield/acre (Kg)	(%)[1]
Cody Oat	July 5	1475.8	108
Craig[2]	" 3	1436.6	105
Leeder	" 7	1432.5	104
Sarry Oat	" 2	1396.1	102
Newton Oat	June 30	1375.9	100
State Pride[2]	July 1	1296.2	95
Clintafe	" 5	1293.7	94
Bannock	" 4	1290.9	94
Clinton 59	" 1	1262.6	92
Beedee Oat	June 30	1238.3	90
Victory No. 1	July 8	1371.8	100
Zenshin	" 5	1558.0	114

1) Relative percentage when the percentage of the check variety, Victory No. 1, is designated as 100%.

2) Varieties introduced from the U.S.A. through the courtesy of Dr. H. L. Shands, Univ. of Wisc.

According to the above cited results, the varieties such as Sarry Oat, Newton Oat and Craig were early matured and showed high yield, seeming to be fairly successful adaptation to the climatic conditions of Hokkaido.

Cold tolerance test of winter oat varieties of the U.S.A., in Hokkaido

When oat seeds were sown in the autumn of Hokkaido they ordinarily scarcely survive through the winter. This is mostly due to the low temperature and the resultant snow fall. In Sapporo, where the experimental field is located, for example, the temperature goes down to about -11.0°C and the field is covered with heavy snow from the middle of November to the early April.

Seeds of some promising varieties which show cold tolerance were introduced from the U.S.A. and are now under test on their agronomical characteristics, starting from the autumn of 1959. These varieties being under observation at present, it is still unknown whether or not they will be able to survive through the winter. According to observations made up to the 4th of December, 1959, however, the following varieties seem to show cold resistance to some extent: Lee, Ferguson, Turf, Lee Coldproof, Forkedeer, Grey Oat, DuBois, Wintok, Ballard (C.I.6980) and Virginia Grey.

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IV. CONTRIBUTIONS FROM THE UNITED STATES: USDA AND STATES

*** ARIZONA ***

*** Oats in Arizona ***

by A. D. Day (Tucson)1/

In 1959, Arizona farmers grew 25,000 acres of oats. This is approximately the same acreage that was planted in 1958. Forty percent of the 1959 oat crop was harvested for grain and 60 percent was used for winter pasture, green chopped feed, and hay.

1/ Agronomist, Department of Agronomy, Arizona Agricultural Experiment Station, University of Arizona, Tucson, Arizona.

The 1959 production of oat grain in Arizona was 17,600,000 pounds, and the state average yield was 1,760 pounds per acre. The 1958 average yield was 1,600 pounds per acre.

The principal varieties of oats grown in Arizona in 1959 were Palestine, Claifornia Red, and Markton for grain production, and Markton for winter pasture, green chopped feed, and hay.

Indio and Curt are two new oat varieties that looked promising in the 1959 Arizona Oat Variety Yield Tests.

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*** ARKANSAS ***

by G. E. Templeton and R. L. Thurman

The 1959 crop year was a relatively good one for small grains in Arkansas. Favorable weather conditions at planting time was coupled with adequate moisture and almost perfect conditions for ripening and harvest. Yields of 100 bushels per acre were recorded in the rice section of the state but the state average of 36 bushels per acre fell short of the record yield of 43 bushels per acre in 1954.

Although total acreage remained about the same as 1958 there was a continuation of the trend toward utilization of oats for pasture and with a concomitant reduction in acreage harvested for gain.

Favorable growing conditions were complimented by a lack of crown rust and/or Helminthosporium blight this year. The highest yields were with varieties susceptible to these two diseases. Races 213-216 were the predominant races of crown rust in the limited collection made. Lines resistant to these races are in the breeding program as well as resistance to races 264 and 290. Incorporation of lines resistant to aphids and/or yellow dwarf is also being considered.

The occurrence of downy mildew on oats and other small grains was observed. Outbreaks were confined to low, poowly-drained areas and was found on both fall and spring planted oats.

Aecia of Puccinia coronata were found on Buckthorn for the first time in the state.

The oat disease work has been carried out by G. E. Templeton who will shift his major emphasis to rice diseases. A replacement is to be made.

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*** CALIFORNIA ***

*** Use of Oats for Hay in California ***

by Coit A. Suneson and Stephen R. Chapman (Davis)

Small grains - principally oats - are cut for hay on about one-half million acres annually in California. They grow during a cooler season and hence have a more favorable water economy than alfalfa. This led us to investigate ratton crop possibilities in 1959. It was shown that variety, stand density, harvest stage, and time of nitrogen fertilization and irrigation all influenced regrowth, but none sufficiently to make the second crop profitable. In the whole experiment the ratton crop accounted for only 12 percent of the seasonal yield. This did not foreclose our interest in this problem for we also observed that some wild oat plants (A. fatua) tiller much better and grow taller than our commercial varieties after cutting in May. Hay production thus became another of our interests with common x wild progenies.

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*** FLORIDA ***

by W. H. Chapman, Quincy

A severe natural epiphytotic of crown rust heavily infected all entries of the 1958-1959 yield trials except derivatives of crosses involving Trispernia or D. L. M. 3, C. I. 7172 and selections from irradiated Floriland. According to varietal reaction races of the 290 group did considerable damage in the nurseries. Collections mailed from the Quincy nurseries in late April showed races 216, 264, 290, and 295 to be present. Limited collections from commercial plantings in Florida showed races 216, 290, 293, and 295 to be present. Although the Landhafer attacking races were present, there was little damage in commercial fields.

Observations concerning extreme variation in morphological characters and pathological reaction in progenies of irradiated Floriland oats were published in Agronomy Journal Vol. 51:163-165, 1959. Approximately 75 head rows of irradiated Floriland selection AB 180 were bulked and increased at Aberdeen in the summer of 1958. Seed supply was sufficient for yield testing at several locations. An increase block was also planted at Quincy in the fall of 1958. Grain yields in the variety tests were quite satisfactory. In field plantings the bulk selection is uniform and has excellent protection from the Landhafer attacking races of crown rust. In 1958 and 1959 this selection along with several other entries showed excellent mature plant resistance to race 264 in specialized rust nurseries at Isabela, Puerto Rico. This material also appeared resitant to race 290 at Quincy and Isabela in 1959. AB 180 has an extreme upright and rapid vegetative growth and little winter hardiness. It grows rather tall but has a fairly stiff stalk and stands well for combining. The kernels have awns which break off in threshing. They have no basal hairs or sucker mouth and are of good quality. Seed has been turned over to the Florida Seed Producers Association for further increase and will be available to the farmers in 1960.

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*** GEORGIA ***

by A. R. Brown, Athens

Oat acreage harvested for grain in 1959 was 276,000 acres with an average yield of 32.0 bushels per acre. An excessively wet spring caused oats to lodge as soon as they ripened. Practically all oats graded "weathered" and over 50 per cent graded materially weathered due to the excess moisture. Some fields had to be abandoned because of lodging, wet ground and weeds.

Yields of the entries in the Central Winter Oat Nursery at Athens were only fair ranging from 48 bushels for Coker 56-18 to 77 bushels for Appler. Due to late emergence, winter killing ranged from 5 per cent for Bronco to 30 for Appler. There was considerable soil borne mosaic on the susceptible varieties. Due to the lateness in maturity there was a heavy epiphytotic of crown rust, ranging from 5 per cent for Coker's 57-20 to 80 per cent for Victorgrain, Fla. Sel. 284-2, Ga. 9077, C.I. 7225, C.I. 6994, C.I. 7143, and Bronco.

by D. D. Morey, Tifton

Oats have made a poor showing this fall in South Georgia. Early planted oats came up during leaching rains in October and quickly ran out of nitrogen. Later planted oats have made poor growth during a dry, cool November and December. Very little grazing has been realized before January this season.

Aphids (Toxoptera graminium) have been found widespread but damage has been relatively light. Because of widespread aphid feeding, barley yellow dwarf virus may again cause considerable damage to the oat crop as it did last season. The oat world collection of 3,318 entries is now making good growth at Tifton. These oats and others from Frank Coffman will be observed for reaction to aphids, barley yellow dwarf virus and possibly other natural occurring diseases. Crown rust centers have been found in oat fields at Albany and Tifton, Georgia.

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*** IDAHO ***

by Harland Stevens and Frank C. Petr, Aberdeen

The 1959 oat crop in Idaho was reported to be the smallest since 1948. This is a reflection of the reduction in acreage as yields were in general above average. The average yields of oats in variety test plots at stations in southern Idaho were equal to or above any of those produced during the past ten years. The average yields of uniform irrigated nursery varieties at Aberdeen ranged from a low of 159.6 bushels per acre for Clinton 59 to a high of 231.6 bushels per acre for Park. A fairly heavy aphid population was observed in the oats in the area. Early planting and an excellent growing season resulted in extremely high yields even in the presence of heavy aphid populations.

Yellow dwarf was reported in all counties, and appeared to be most prevalent in the southeastern part of the state. Yield reduction due to the disease was observed only in late-planted fields. Proportionately more yellow dwarf appeared to be present in oats than in barley as compared to other years, indicating a possible shift in prevalence of aphid species. In experimental material at the Aberdeen Station, yellow dwarf was especially severe on Black Mesdag and Craigs-after-lea as well as hybrids derived from the latter. C.I. 7232, a derived tetraploid, appeared to be completely resistant. Late-planted oats and barley were sprayed periodically with malathion to avoid possible total loss of some breeding material. Blasting was encountered mostly in conjunction with yellow dwarf. Stem rust occurred to a limited extent in late-planted experimental oats. The low incidence of loose and covered smut could be attributed to the widespread use of resistant varieties and adequate seed treatment by growers.

Groat percentage was somewhat lower than anticipated as yields were generally high. Markton maintained its superiority in groat percentage while Garry and hybrids derived from it had a high proportion of hull. Intensive selection for quality and yield is currently in progress in populations from the following crosses: Sauk x Simcoe, Park x Binder, Rodney x Shelby, C.I. 6740 x Improved Garry, C.I. 6740 x C.I. 7013, and Overland x (Bonda x H-J x S.F.) x Mo. 0-205.

Over 500 F_3 lines from six crosses of superior lodging resistant varieties were evaluated with the snap test. About 70 lines with the best snap scores were reselected and their progeny will be tested again prior to the second cycle of recombination and recurrent selection.

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*** ILLINOIS ***

by C. M. Brown and Henry Jedlinski, Urbana

Oats produced a state average yield of 40 bushels per acre in 1959. This is a drop of 15 bushels an acre below the near record crop of 55 bushels an acre in 1958 but is only about 3 bushels below the 1948-57 average. Yellow-dwarf appeared to be primarily responsible for the lower yield in 1959.

The acreage of oats harvested in Illinois continued to decline in 1959. The acreage and yield per acre for the past several years are as follows:

	Acreage Harvested Thous. acres	Yield Bu/A
1948-57 ave.	3328	42.4
1955	3195	56.0
1956	3041	46.0
1957	2751	38.0
1958	2427	55.0
1959	2233	40.0

The three leading oat varieties in acreage in 1959 were Clintland, Newton and Nemaha. Varieties that showed a significant increase in acreage over 1958 were Clintland, Newton and Minhafer, while the varieties Clinton and Nemaha showed a significant decline. The percentage acreage of several leading varieties in Illinois for the past 5 years is as follows:

	Percent of Total Acres Planted				
Variety	1955	1956	1957	1958	1959
Clarion	1	4	6	2	1
Clinton	48	39	35	7	4
Clintland	3	11	18	36	45
Columbia	5	5	2	1	1
Minhafer	-	-	-	1	3
Mo. 0-205	7	4	2	1	2
Nemaha	22	23	20	24	15
Newton	-	-	3	16	19

The Disease Situation

In 1959 the majority of oats grown in Illinois were severely damaged by the Barley Yellow-Dwarf Virus. West-central and central areas of the state were affected most. Other disease appeared to be of only minor importance in contrast with 1957 and 1958 when crown rust and scab were prevalent.

Individual patches especially along the margins of fields and in many instances the whole fields suffered such heavy losses that they were not worth harvesting. This was particularly true where the variety Clintland was grown.

Late plantings or plantings made on fields of low fertility were most severely damaged.

The yellow-dwarf epiphytotic was associated with large populations of green bugs which appeared early in the spring. Consequently, the effect of the disease was further accentuated by the toxicity of this species. Other species of vectors were also present and could have contributed to the wide spread of the virus.

Some varieties like Putnam, Newton, and Tonka were observed to be damaged less severely than Clintlnad 60, Clinton, Clintland and Minton.

Breeding for Barley Yellow-Dwarf Resistance

Yellow-dwarf resistant or tolerant lines of oats that were selected from the world oat collection in 1954 and 1955 were crossed with adapted varieties such as Clintland, Newton, Calrion, Burnett, Fayette and others. Also crosses were made among selections that exhibited different degrees of yellow-dwarf resistance. In each generation following these crosses, selection has been made on the basis of yellow-dwarf resitance in the field and in the greenhouse. Many of these segregates appear to have resistance equal to Albion, which is the most resistant hexoploid variety under Illinois conditions. Some of the segregates from crosses of selections intermediate in resistance have shown higher resistance than either parent indicating transgressive segregation. Some selections were included in preliminary yield nurseries for the first time in 1959. Most of them showed good yellow-dwarf tolerance and yielded quite well in the severe yellow-dwarf epidemic of 1959. However, most of the selections were somewhat lower in test weight and weaker in straw than most of the well adapted varieties that are grown in Illinois.

In recent years a backcross program has been initiated to incorporate the Albion source of yellow-dwarf resistance into some of the well adapted varieties. As many as 3 backcrosses following the original cross have been made using Clintland type and Minhafer. On the basis of greenhouse tests, it appears that at least a large part of the yellow-dwarf resistance of Albion is being transferred by this method. Further tests in the field will be required to verify these preliminary findings.

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*** INDIANA ***

By F. L. Patterson, J. F. Schafer, R. M. Caldwell, L. E. Compton (U.S.D.A.) (Breeding, Pathology, Genetics).
H. F. Hodges, R. R. Mulvey and C. F. Douglas (Varietal testing).
K. E. Beeson (Extension).
W. D. Sewell, D. E. Zimmer, H. F. Lafever, P. Bhamonchant and S. K. Gilbert (Graduate Students).
Purdue University, Lafayette

The 1959 Season

Dry late March and early April weather permitted early seeding of oats in much of Indiana. May was near normal, but June was extremely dry with little rain from heading to maturity (1.1 inches in June at Lafayette.)

A heavy infestation of aphids, including the greenbug, occurred in early May, quickly followed by the most severe yellow dwarf epidemic ever observed by the authors. The failure to obtain high oat yields (state average yield of 37.5 bu/A compared to 51 in 1958, a favorable oat season) was a result largely of the virus infection possibly with some assist from the dry weather.

Nursery yield plots were sprayed with the systemic insecticide, Dimethoate, which gave outstanding protection against spread of the yellow dwarf virus, allowing an average yield of 94 bu/A for 197 entries in the Advanced Nursery Performance test and indicated the virus infection to be the main adverse factor of 1959 oat production.

The Disease Situation

The yellow dwarf epidemic constituted the only important oat disease aspect in Indiana in 1959. However, this disease alone made 1959 one of the most severe oat disease years on record. The authors recently estimated the loss from yellow dwarf to be in excess of 25 percent of the oat crop. (See Plant Disease Reporter Supplement 262 where this outbreak is discussed in detail.)

The brightest aspect of this disease situation in Indiana was the outstanding performance of the Putnam and Newton varieties in the presence of the epidemic. On the basis of the dwarfing of plants, "red leaf" symptoms, and relative yields of varieties, sprayed and unsprayed for aphid control, Putnam and Newton appeared moderately resistant to the barley yellow dwarf virus. Clinton types in contrast, were very susceptible. In an early seeded Clintland 60 field at Lafayette 75% of the plants were estimated to be infected and yields were reduced about 25%. Newton and Putnam were grown on 20.2 percent of the Indiana oat acreage so contributed considerable protection from loss.

Protection of Oats from Barley Yellow Dwarf Infection Through Aphid Control with Dimethoate

The English grain and Green Bug aphids (Macrosiphum graminarium (Kby)) and (Toxoptera graminum (Rond)) appeared in abundance in spring oats at Lafayette, Indiana on May 13, 1959, at which time isolated plants were showing symptoms of yellow dwarf. Therefore, on May 20 the entire experimental nursery was sprayed with a systemic insecticide, Dimethoate (O-O dimethyl S(N-methylcarbamoyl-methyl) phosphorodithioate), at the rate of 2/3 pint ("containing 46% soluble concentrate") in 15 gal. of water per acre at 80 pounds pressure. This application produced no obvious host injury. Oats in other areas sprayed at 1 pint per acre likewise apparently were not injured. The aphids were dead the following day and the oats remained aphid free for at least 2 weeks and until populations were naturally, greatly reduced on nearly, unsprayed oats.

The sprayed area contained a 4-times replicated, late-sown (May 1) yield test of several varieties including Clintland. This variety also was used as a "filler" variety on two sides of the sprayed plot. The filler planting was unsprayed except where the sprayer was turned at the end of the sprayed nursery. The oats in the unsprayed areas were a complete loss from yellow-dwarf damage. Few tillers headed and the better panicles were not over 18 inches high. In contrast the Clintland sprayed in the experimental planting yielded 76.3 bu./A.; a very good yield from this late seeding date.

The proportion of diseased tillers in the sprayed plots was not accurately determined, but it is estimated that approximately 10% showed symptoms. This infection could have occurred before spraying. Inasmuch as the sprayed plots were adjacent to large unsprayed areas of BYDV infected oats where heavy aphid populations existed, it seems apparent that the Dimethoate provided prolonged protection against spread of the virus by aphids migrating from the unsprayed areas.

1959 Indiana Oat Production
(Data obtained from Purdue Department of Agricultural Statistics)

The Indiana oat acreage continued dropping for the fourth consecutive year, presumably in response to the poor economic position of oats in relation to other field crops. The harvested acreage this year was the lowest since 1885 and the production the lowest since 1944. It appears that oat acreage in this area will continue to drop in favor of corn and soybeans. The acreage, yields, and production for the last 5 years are as follows:

	Acreage Harvested (000)	Acre Yield Bu/A	Productions (000) Bu
1955	1,302	51.0	66,402
1956	1,250	45.0	56,250
1957	1,025	34.0	34,850
1958	943	51.0	48,093
1959	858	37.5	32,174

Oat Varieties Grown in Indiana

In 1959 the Purdue Department of Agricultural Statistics continued the annual small grain survey begun in 1957.

	Percent of State Oat Acreage 1957	1958	1959
Clintland	44.9	49.3	53.8
Newton	8.4	15.8	18.2
Clinton 59	26.8	20.0	14.7
Bentland	4.9	4.8	5.0
Putnam	--	--	2.0
Minhafer	--	--	1.3
Mo. 0-205	1.0	0.4	0.1
Dubois (winter)	5.2	3.0	2.4
Other and Unknown	8.8	6.7	2.5

Oat Varieties Certified in Indiana, 1959

The acreage of certified seed oats produced in Indiana was again down in 1959, following the trend of oat production in the state. A total of 6,442 acres of oats was inspected for certification by the Indiana Crop Improvement Association. Clintland 60, in its initial year of release, accounted for over one-third of this acreage. Clintland also remained in certification in volume while the remaining varieties were considerably lower.

	No. of Years Certified	Foundation Acres	Registered Acres	Certified Acres
Clintland 60	1	165	2,016	-
Clintland	6	-	482	1,454
Minhafer	2	12	742	254
Newton	4	-	302	326
Putnam	3	10	113	311
Dubois (winter)	7	-	55	159
Bentland	4	-	41	-

Varietal Performance Tests and Recommendations

Performance of varieties for 1954 to 59 was summarized in Purdue University Agricultural Experiment Station Bulletin 691. (December) 1959. Newton, Putnam, Goodfield and Minhafer were generally superior to Clinton types in Indiana in 1959.

Varieties recommended for seeding in Indiana in 1960 are: Clintland, Clintland 60, Goodfield, Minhafer, Newton, Putnam, Dubois (winter) and Norline (winter). Bentland is recommended for forage.

Norline Winter Oat Released

Norline Winter oat, Purdue 392A2-13-1-2-1, CI 6903, was jointly released by the Purdue and New Jersey Experiment Stations from Breeders Seed multiplied by Steve Lund in New Jersey. Breeders seed has been shared with other interested stations.

Norline was bred from the backcross of Forkedeer by an unreleased line of Lee-Victoria obtained from H. C. Murphy. It was developed in the Purdue University and U. S. Department of Agriculture cooperative breeding program. Norline has been tested for 3 years in regional nurseries in addition to testing in Indiana and New Jersey. Its performance is described in detail in a mimeograph recently distributed to oat breeders of the North Central States. Norline appears outstanding in winter hardiness and should be particularly adapted to the northern edge of the winter oat region.

Multiplication of Rust Resistant Putnam Derivative

To utilize the moderate resistance of Putnam to the barley yellow dwarf virus in a rust resistant stock, a backcross derivative ($Putnam^4$ x Minnesota 313), Purdue 5638G1-5, with A B D resistance to stem rust and Landhafer resistance to crown rust is being multiplied on 3 acres at Yuma, Arizona, during the winter of 1959-60. This line will be proposed for regional tests in 1960.

Performance at Lafayette in 1959

	Yield Date Seeded			Test Weight Date Seeded		
	Early Bu.	Medium Bu.	Late Bu.	Early lb.	Medium lb.	Late lb.
Putnam	84	79	87	34.7	33.8	31.9
Purdue 5638G1-5	104	103	74	35.8	32.6	29.3
Clintland	95	81	73	33.7	34.9	30.2

Straw Strength

A type of lodging resistance in which the stem remains succulent and somewhat green after grain is ripe was recognized in 3 crosses in 1959. Two of these involved intercrosses of Clintland and MO. 0-205. Unfortunately yields of lines with the greatest straw superiority (superior to both Clintland and MO. 0-205) did not yield as well as other lines from the same cross with ripe straw although yields of all were equal or greater than those of the parental varieties. Yields were somewhat related to degree of expression of green straw in all 3 hybrids.

Straw strength derived from Milford again appeared excellent in 1959.

The interaction of genotype x soil fertility level using new stiff strawed types of oats is being studied.

Stem Rust Resistant Clintland Derivatives

Clintland backcross derivatives with stem resistances D B D, A B or A B D were developed and compared for yield. Yields of backcross derivatives were generally similar in 1959 indicating no important deleterious effects were associated with any of these gene blocks.

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*** IOWA ***

by K. J. Frey, J. A. Browning, M. D. Simons, K. Sadanaga, J. G. Wheat, F. P. Gardner

Oat growing conditions were very favorable in 1959 with no diseases of consequence in most of the state. However, an epiphytotic of yellow dwarf occurred in sections of southern and northwestern Iowa rendering some fields in these areas nearly worthless. Losses from this disease was estimated to be 12% for the entire state. Other diseases were present in small amounts to give a total estimated reduction in yield of 16%. Except for the yellow dwarf epiphytotic areas state yields doubtless would have been considerably higher than the official estimate of 42.5 bu./A.

Isogenic lines

Lines isogenic except for the different stem rust resistance genes have been obtained from the backcrossing program to improve stem rust resistance of Bonham and Clintland. Seed of these lines of the following genotypes is available and can be supplied to interested workers in small quantities: Abd, aBd, abD, ABd, and aBD.

Potential Varieties

Four experimental oat strains were increased in 1959 for possible release by the Iowa station:

(1) A 299 - This strain was entered in the North Central Uniform Nursery in 1959. The seed sent for this nursery contained a mixture of tall plants. A purification devoid of tall plants will be increased in 1960.

A 299 was selected as a single short plant in 1955 from an X_2 plot derived from Clintland. It was increased and entered in the Elite yield tests in Iowa in 1958 and 1959 (5 locations). Its performance in comparison with Clintland was as follows:

Variety	Yield	T. Wt.	Straw Strength	Head date	Height
			1958		
Clintland	108	32.9	1.5	6-9	37
A 299	108	32.2	1.0	6-10	34
			1959		
Clintland	89	32.5	1.7	6-16	43
A 299	90	32.6	1.2	6-17	38

Essentially A 299 is a short Clintland. Its head length is somewhat shorter than Clintland but it possesses the same disease resistance as Clintland.

(2) No. 5063 - A strain selected from the cross Clinton x Garry which will be entered in the North Central Nursery in 1960. About 30 bushels of seed is available for planting in 1960. No. 5063 is somewhat shorter than Clintland, better in lodging resistance, produces white plump kernels, and is early in maturity. It possesses the ABC combination of genes for stem rust resistance and field resistance to crown rust.

(3) C 648 - Developed from crossing two parallel backcross lines from Bonham^5 (Cherokee^3 x R.L. 2105), one which carried the A gene and the other the BC gene for stem rust resistance. In all appearances and in tests for agronomic performance it is identical to Bonham or Cherokee, but it does possess the ABC combination of genes. Eight backcross lines were bulked giving a total of 3 bushels of seed which will be available for increase in 1960. This strain will be in the North Central Nursery for 1960.

(4) C 649 - Developed from crossing two parallel backcross lines from Clintland^8 x R.L. 2105, one which carried the A gene and the other the BC gene for stem rust resistance. The C 649 strain resulted from bulking 18 lines which were homogeneous for the ABC gene combination. About 20 bushels of seed are available for increase in 1960, but it is questionable whether the increase will be pushed ahead. C 649 is susceptible to races 290 and 264 of crown rust and it may be wise to cover these deficiencies before the strain is released to growers. To the present 4 backcross generations have been made in a program designed to add the crown rust resistance genes from P.I.174544 and C.I. 7232 to C 649. The C 649 strain will be in the 1960 North Central Uniform Nursery.

Oat Composite Available for Distribution

Each year the Iowa station sends a batch of F_1 oat seeds to Aberdeen, Idaho for the production of F_2 seeds. The environmental conditions at Aberdeen are conducive to abundant seed production resulting at times in 100-300 grams of seed from one plant. The remnant F_2 seed (10 gms per F_2) from the Aberdeen grown material has been used to put together composites which may be useful as emergency gene pools, and bases for maximum cross fertilization opportunity, or for practicing mass selection.

In 1958 a composite constituted from the following crosses was grown at the Agronomy Farm at Ames, Iowa. The seed harvested from this composite (A 612 in 1959) was planted with a grain drill at the same location in 1959 resulting in the production of 30 bushels of F_4 seed. Any oat breeder interested in obtaining 1959 seed of this composite can have up to 3 bushels upon request. (As long as the supply lasts.)

Cross No.	Parentage	No. lines
C 699	Bonham^2 x P.I. 174545	7
C 698	Bonham x (Cherokee x C.I. 2923)	9
C 697	Bonham^3 x P.I. 197279	11
C 700	Clintland^2 x C.I. 2923	15
C 701	Clintland^2 x P.I. 174545	11
C 702	Clintland^2 x C.I. 4636	10
C 703	Clintland x (Garry x C.I. 4636)	18
C 572	Clintland^8 x R.L. 2105	14
C 573	Clintland^8 x R.L. 2105	9
C 574	Clintland^8 x R.L. 2105	11
C 575	Clintland^6 x (Cherokee^2 x R.L. 2105)	10
C 576	Clintland^6 x (Cherokee^2 x R.L. 2105)	23
C 577	Clintland^6 x (Cherokee^2 x R.L. 2105)	5
C 578	Clintland^6 x (Cherokee^2 x R.L. 2105)	11
C 579	Clintland^7 x R.L. 2105	3
C 580	Clintland^7 x R.L. 2105	8
C 581	Clintland^7 x R.L. 2105	15
C 582	Clintland^7 x R.L. 2105	11
C 649	Clintland^8 x R.L. 2105	36
C 648	Bonham^5 (Cherokee^2 x R.L. 2105)	35
C 559	Bonham^5 (Cherokee^3 x R.L. 2105)	9
C 560	Bonham^5 (Cherokee^3 x R.L. 2105)	8
C 561	Bonham^5 (Cherokee^3 x R.L. 2105)	5
C 562	Bonham^5 (Cherokee^3 x R.L. 2105)	2
C 563	Bonham^5 (Cherokee^3 x R.L. 2105)	9
C 564	Bonham^5 (Cherokee^3 x R.L. 2105)	10
C 565	Bonham^5 (Cherokee^3 x R.L. 2105)	11
C 566	Bonham^5 (Cherokee^3 x R.L. 2105)	12
C 567	Bonham^5 (Cherokee^3 x R.L. 2105)	10
C 568	Bonham^5 (Cherokee^3 x R.L. 2105)	6
C 569	Bonham^5 (Cherokee^3 x R.L. 2105)	7
C 570	Bonham^5 (Cherokee^3 x R.L. 2105)	9
C 571	Bonham^5 (Cherokee^3 x R.L. 2105)	11
C 684	C.I. 5254 x A 73-5-4	
C 664	Craigs-afterlea x Binder	
C 662	Clintland x Binder	
C 677	Clintland x A 72-165-5	

Cross No.	Parentage	No. lines
C 669	Putnam x C.I. 5254	
C 659	Newton x P.I. 193027	
C 657	Clintland x Putnam	
C 661	Putnam x C.I. 7318	
C 670	Putnam x A 158-11	
C 671	A 158-11 x C.I. 7318	
C 672	C.I. 5254 x A 158-11	
C 674	A 158-11 x Burnett	
C 675	Blintland x A 72-148-10	
C 676	Bonham x A 72-165-5	
C 678	Putnam x A 72-165-5	
C 679	Newton x A 72-165-5	
C 680	Clintland x A 71-6-2	
C 682	Putnam x A 71-6-2	
C 683	Clintland x A 73-5-4	
C 685	[Bonham^5 x (Cherokee^3 x R.L. 2105)] x C.I. 7318	
C 686	Andrew x C.I. 1003	
C 687	Burnett x C.I. 2413	
C 688	Andrew x C.I. 5977	
C 689	C.I. 6748 x Bonda	
C 691	(Clintland^7 x R.L. 2105) x [Bonham^5 x (Cherokee^3 x R.L. 2105)]	
C 696	(Clintland^7 x R.L. 2105) x Burnett	
C 704	[Bonham^5 x (Cherokee^3 x R.L. 2105)] x C.I. 7318	
C 705	[Bonham^5 x (Cherokee^3 x R.L. 2105)] x A71-6-2	
C 706	(Clintland^7 x R.L. 2105) x A72-165-5	
C 707	A73-5-4 x C.I. 5254	
C 650	(Bonham^4 x P.I. 185787) x Newton	
C 651	Clintland x Newton	
C 652	Burnett x Newton	
C 655	Clintland x C.I. 5864	
C 656	Clintland x Beedee	
C 658	(Bonham^4 x P.I. 185785) x C.I. 7154	
C 660	Clintland x C.I. 7318	
C 666	C.I. 5254 x Clintland	
C 667	Craigs-afterlea x C.I. 5254	
C 668	Bonham x C.I. 5254	
C 531	Craigs-afterlea x A158-11	
C 552	Bonham x C.I. 5977	
C 553	Burnett x C.I. 3030	

Trisomics

Twin seedlings have been obtained in Cherokee and Clintland varieties. In addition to the usual diploid plants (2n = 42) recovered among twin seedlings, two triploids (2n = 63), one in each variety, were obtained and grown to maturity. Triploid Clintland failed to set any seed, either through selfing or through backcrossing to Clintland. Five selfed seeds and one F_1 seed from a cross to Clintland were secured from triploid Cherokee. All plants grown from selfed seeds were sterile. The F_1 hybrid between triploid Cherokee and Clintland set two F_2 seeds. One of the F_2 plants produced one seed, the other 27 seeds. A number of trisomes have been recovered in F_3 progenies from the fertile plant. Since morphological differences are not apparent in the trisomes growing in the greenhouse, cytological studies have been initiated to identify the extra chromosome involved in the trisomes.

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*** KANSAS ***

by E. G. Heyne, E. D. Hansing, C. O. Johnston, Lewis Browder, Webster Sill, Jr., Robert Ellsworth (Manhattan), and James Wilson (Hays)

The 1959 season was another poor oat year in Kansas. The harvested acreage was about two-thirds the ten-year average, or about 681,000 acres. Yield was below average and estimated as slightly more than 23 bushels per acre for a total state production of 15,633,000 bushels. This is about 40% less than the ten-year average for 1948-1957.

Moisture and temperature probably were more adequate for oat production in Kansas than any time during the past ten years, but the most severe outbreak of red leaf virus on record occurred in 1959. It was estimated that 50 to 75% of the oat plants in eastern Kansas were infected with red leaf, causing an estimated loss of about 5,400,000 bushels. The chief vector for the spread of the virus in 1959 appeared to be the greenbug.

Kanota and Kanota derivatives were outstanding in their resistant response to red leaf. Kanota generally yields low in comparison to other varieties in Kansas, but in 1959 at Manhattan, Kanota produced 2040 pounds per acre while Minhafer produced 596 pounds. In northeastern Kansas at Powhattan, Kanota yielded 2024 pounds and Minhafer, 1023 pounds. No lodging or rusts were present which usually decrease the yield of Kanota. The good performance of Kanota in 1959 was attributed to its resistance to red leaf. Several strains of Richland x Fulghum grown at Manhattan were outstanding for their resistant response to red leaf. Andrew and Mo. 0-205 were among the better strains for resistance to red leaf. Clintland 60 was the most severely damaged variety in 1959.

The oat breeding program at Kansas has largely become a program of testing segregating material obtained from other oat workers. Decrease in operating funds for cereal breeding has primarily affected the oat breeding project in relation to the winter barley and wheat work. This year, the oat breeding nursery was so severely damaged by red leaf that no rust readings were possible and no material was harvested. Most of the strains tested for smut reaction were resistant except for several strains that are susceptible to the Victoria races found in Kansas.

by Wayne Fowler and Tom Roberts (Manhattan)

The oats approved for certified seed production in Kansas in 1959 dropped to 941 acres, only 80% of the 1958 acreage. Minhafer, in its first year of eligibility for certification in Kansas, accounted for 660 of the approved acres.

1959 was fair to poor for oats seed production. Late planting and red leaf caused abandonment of several fields. The quality of seed, however, appears to be good. Present price of certified seed oats offers little incentive for seed production.

Trueness-to-variety plots planted in the spring of 1959 lead us to believe there is more than one strain of Minhafer under certification. This caused considerable concern in Kansas because seed from several states was accepted as eligible for certified seed production. If our suspicions are correct, we are in the predicament of offering certification on more than one kind of Minhafer.

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*** KENTUCKY ***

by Verne C. Finkner, Lexington

<u>1959 season</u>.- The 1958-59 season was one of the coldest in Kentucky's history according to weather records and was one which clearly showed the need for greater winterhardiness for consistant winter oat production. Our spring season was favorable for spring oat production and higher yields were obtained from our spring oats than from our winter oats.

<u>State yield tests</u>. - There was little difference in the yield of the named winter oat varieties this year. The most encouraging part of the test was the performance of some of our experimental varieties at Lexington where winterkilling was the most severe. The best performing material is indicated in the following table:

% survival	Bu/A	Variety	Pedigree
76	51	Ky.56-618	Wintok X C.I.4316
66	46	Ky.56-527	Do
52	41	Ky.53-820	Fulwin X Wintok
41	41	Ballard 45-65	Selection from
25	15	Wintok	C.I. 2499

Hardy oats from world collection. - A group of approximately 300 collections from the world oat collections have been screened at Lexington since 1957. The most hardy material in 1959 were C.I.2276, 3173, 4469, 4491, 4494, all of which survived as well as or better than Wintok and Nysel. Selection within some of the 300 collections appears to be worth while.

Date of Planting. - All dates of planting after the first planting date (Sept. 15) winterkilled completely.

Spring planting of winter oats. - Spring planted winter oats made a fair crop for the first time in 3 years. Yields were still below the better spring types, however.

Breeding program. - While we are continuing breeding for winterhardiness as our major objective, we are going to put more emphasis on strength of straw. We also feel that data from space plant material might speed up our selections procedures and hope to find better methods of space planting and/or transplanting. The use of tobacco setters for transplanting appears promising.

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*** MAINE ***

by Clinton R. Blackmon, Orono

The 1957 growing season started with dry weather which lasted until heading time. This was followed by the persistent rains. Oats were of generally shorter height and produced grain of lower test weight.

The Barley Yellow Dwarf Virus disease on oats continued to be a problem in all producing areas. In a state-wide survey, early planted oats (May 10-20) were about 5 percent infected with BYDV; whereas, late planted oats (June 1-10) were about 50 percent infected.

Since the aphid flights into the oat fields began in late June, many of the early planted varieties probably escaped infection until about the heading stage. If this trend continues oats should be planted very early to escape serious infection with BYDV.

The Maine Agricultural Experiment Station has a project underway to determine the sources of spring infection, vectors responsible and varietal resistance to BYDV on oats. Of 222 varieties and selections inoculated with BYDV and transplanted to the field in 1959, most were above 70 percent infected and only 10-20 percent as vigorous as non-infected plants. With this method a good differential in tolerance was established between varieties.

A preliminary screening of the World Oat Collection has been completed. In addition to valuable data compiled on all varieties, many outstanding varieties have been saved for use in the breeding program.

Several oat crosses which survived the screening program were entered into the advanced yield and seed increase program. One strain of Beaver x Clinton oats was not tolerant of BYDV and was reselected.

The oat hybridization program has been strengthened by use of material from the World Oat Collection. Work is underway to secure greater straw strength in hulless oats. Management tests were initiated to determine the best seeding rates for the recommended oat varieties. Studies have been continued on liming and fertilization.

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*** MASSACHUSETTS ***

by I. K. Besbalow
Field Seed Research, Eastern States Farmers' Exchange
West Springfield, Massachusetts

Many of our different hybrid combinations of winter oats were grown in 1959 as selections or bulk hybrids. Three hundred and eighty entries of World Collection and 80 entries of The Uniform Nursery of Hardy x Hardy bulk crosses received from USDA (Beltsville) were also planted in the fall of 1958. The winter of 1958-59 was very severe for oats. Cold temperatures, without snow, prevailed throughout much of the winter, causing 100 percent killing.

Eleven plants of two of our hybrid combinations survived. Three plants of the cross Dubois x Nysel (formerly New York Selection) and eight plants of the cross (Hairy Culberson x Nysel) x Dubois. I hope these surviving plants are winterhardy oats because they are derived from our new lines 13A (crosses of Dubois x Nysel) and 4A /crosses of Hairy Culberson x Nysel)xDubois/. 13A (C17300) was tested in 1957-58 and 1958-59 on the Uniform Winter Hardiness Nursery. An average of 30 stations (19 states) indicated that C17300 ranked first in survival in both 1957-58 and 1958-59.

The growing season for spring oats was much more favorable. The yields of many varieties were high but the test weight was low and only few varieties had a normal weight per bushel. The drought after heading caused this low test weight of many varieties. The highest yielders were three new selections: C17271, C17211 and C17458, yielding 70.5, 70.0 and 65.0 bushels per acre, respectively. Clintland and Mo. 0-205 were highest in test weight both with 33.0 pounds per bushel. The lowest bushel weight 24.5, was obtained for Tama.

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*** MICHIGAN ***

by J. E. Grafius and R. L. Kiesling, East Lansing

The 1959 oat growing season was cool and wet during the earlier period but changed to periods of higher temperatures and drought in its later stages. The red leaf virus was spread during this cool, wet period and the intensity of the symptoms increased during the warmer periods of June and July. Red leaf of oats caused large losses in some areas of Michigan especially in the southwestern areas of the state. Drought conditions developed as the oats matured and resulted in reduction of yields. This reduction was spotty but was most severe in the southwestern area of the state.

Garry showed tolerance to the virus attack and yielded more than Clintland at several locations. Lines from the cross (Beaver Garry X Clinton) Clintland were selected for increase. These lines are white oats earlier in maturity than Garry. They excel Clintland in yield but are only equal to Garry in a cool season. These selections have the ABCd genes for stem rust resistance.

Selection for parental material from other crosses continues in the direction of later maturing oats with crown rust, stem rust, and Septoria resistance. High yield, good straw strength, and heavy test weight are emphasized in the breeding program.

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*** Michigan ***

by S. M. King, Chatham

Michigan's Upper Peninsula has long been a "forgotten area," agriculturally speaking. However, excellent yields can be obtained on the 65,000 acres planted to oats each year. Many farmers get more than 80 bushels per acre.

The highest-yielding varieties are the tall, late-maturing ones which prefer cool night temperatures. These include Ajax, Abegweit, Garry, Rodney and Simcoe. Fundy, a few days earlier, has yielded well in test plots. The 1959 crop was hurt by a severe infestation of red leaf.

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*** MINNESOTA ***

by W. M. Myers, F. K. S. Koo,
M. B. Moore, and B. J. Roberts; St. Paul

I. Selections from a group of crosses made in 1953 continued to exceed the check varieties in yield, grain characters, etc. in the 1959 rod row trials. The most promising strains will be tested in 1960 at more locations in Minnesota. Certain lines selected from the crosses of Rodney with /Landhafer x (Mindo x Hajira-Joanette)/ x Clinton or with /Landhafer x (Mindo x Hajira-Joanette)/ x $Andrew^2$ have also shown superiority in yield and other characteristics in the trials. All these strains possess the ABCD genes for stem rust resistance and Landhafer gene for crown rust resistance.

II. About 300 selections are being tested to either race 264 or 290 of crown rust in the Puerto Rico Rust Nursery. The new source of crown rust resistance is derived from either PI 174544 or Ascencao. Presumably some of these lines carry a combination of this new source of resistance and other stem and crown rust resistance.

III. A new phase of transferring crown rust resistance from the species with lower chromosome number to the hexaploids has been initiated. The resistance source used in the crosses is from the selections of the cross Black Mesdag x S.P. 101 (from F. A. Coffman) which have proved to be resistant to crown rust races 263, 264, 274, and 294. The F_1's of certain combinations have set a good number of seeds but the others only a very few, indicating there might be some cytological irregularities in some material derived from Black Mesdag x S.P. 101.

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*** MISSISSIPPI ***

by Donald H. Bowman and Paul G. Rothman
(Delta Branch Experiment Station, Stoneville)

The 1959 oat crop in Mississippi was characterized by an epiphytotic of barley yellow dwarf. Estimated losses in grain yields were as high as 30 to 40 percent. No oat field observed was entirely free of the disease, but great variations in the amount of damage were evident. A complete report is given in The Plant Disease Reporter, supplement 262, December 15, 1959. Generally low temperatures prevailed throughout the winter of 1958-59. Plant growth was limited during this period. The incidence of crown rust was low causing only minor damage in most areas of the State. Leaf spot, caused by *Helminthosporium avenae*, caused major losses in scattered areas especially in the southern part of the State. Damage occurred as a seedling disease on early planted fields and again in the spring on more mature plants. The fifth generation of irradiated Delair material was grown in 1959. Almost all of the progenies were "Delair-like" in appearance and plant height. The few short plants were completely sterile. All the material was discarded except for a progeny from a single plant selected in 1957 which was resistant to crown rust races 202 and 216 and moderately resistant to stem rust races 2, 7 and 8. Backcrossing of short semi-sterile selections to Delair to recover fertility and retain the shorter straw length is currently underway. Delair continues to be an outstanding oat variety in the Mississippi Delta. A type with shorter straw could greatly improve lodging resistance.

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*** MISSOURI ***

J. M. Poehlman, Dale Sechler, Charles Hayward, Marvin Whitehead, and Oscar Calvert (Columbia), Carl Hayward (Pierce City) and Arnold Matson (Gideon)

Spring Oats

The 1959 Missouri oats crop, resulting from late seeding, severe disease, and insect damage, produced the lowest yield per acre of the past ten years. For the third straight year unfavorable weather in early spring cut the acreage seeded. The 1959 acreage of 759,000 acres was the second lowest since 1872; only 1958 with 696,000 acres was lower. Acre yields in 1959 averaged only 25 bushels, 7 bushels below 1958, and 4 bushels below the 10 year average. Total production was the lowest since 1934.

Barley yellow dwarf virus disease was widespread and severe in 1959. Its appearance and the severe damage to the oats crop followed the dissemination and rapid build-up of aphids on small grains over the entire state during the last two weeks of April and the first week of May. Symptoms of aphid feeding were observed shortly thereafter on the oats plants. This was followed by yellow-green and yellow-orange to red coloration of leaf blades and leaf sheaths, reduction in tillering, dwarfing of tillers, and blasting of spikelets. A severe bacterial leaf infection with accompaning exudate formed a complex with the barley yellow dwarf. As the two diseases were not observed except in the complex the resultant loss from the bacterial fraction alone could not be determined. Greenhouse studies with the isolated bacterium has demonstrated its parasitic nature. Varieties in drill plots at Columbia ranged in yield from 9.0 bushels for the more susceptible to 48.4 bushels for the more resistant varieties, with a correlation coefficient of -.871 for estimated percentage of leaf area damaged vs. yield. C.I. 7448, /(Victoria x Hajira-Banner) x (Victory x Hajira-Ajax)/ x Mo. 0-205,[2] and Tonka were most resistant, each with only 15 percent of the leaf area damaged. Clintland and Clintland 60 with 90 percent damage were among the most susceptible varieties. Other standard varieties and the percentage of leaf area damaged were Newton 30%, Andrew 45%, Mo. 0-205 45%, Burnett 50%, Goodfield 55%, Macon 60%, Minhafer 60%, and Nehawka 75%.

Crown rust appeared early and caused some damage in southern Missouri but did not spread extensively into central and north Missouri where leaf blades of oats had already been damaged extensively by yellow dwarf. Stem rust was observed only as trace infections.

Breeding objectives are earliness, high yield, good seed quality, stiff straw, and resistance to rusts and smut. Resistance to yellow dwarf must now be considered.

Winter Oats

Only the Southeast and Southwest areas of the state may be considered safe for the production of winter oats and there only the most hardy varieties can be grown. Greater winterhardiness is therefore essential for the northward extension of the winter oat acreage in Missouri.

Selections with greater apparent hardiness than Wintok and Nysel have been selected from bulked seed of Hardy x Hardy crosses distributed by Mr. F. A. Coffman. Many of these selections have been observed and several have now been advanced into state and regional tests. Columbia, Missouri is an excellent location to select for winterhardiness since the most hardy varieties seldom survive more than 50 to 60 percent.

Recommended Varieties

Spring oats: Macon, Mo. 0-205, Andrew, Minhafer.
Winter oats: Dubois, Bronco.

New Varieties and Increases

Macon oats was distributed to certified growers in Missouri in 1959 and 12,500 bushels of certified seed were produced in spite of the unfavorable season.

C.I. 7272, Macon x /(Victoria x Hajira-Banner) x (Victory x Hajira-Ajax)/ was increased in 1959 and 900 bushels of seed produced. This strain has superior straw and seed quality, moderate resistance to crown rust, ABC genes for stem rust resistance, and good yield in Missouri. It lacks uniformity and was very susceptible to yellow dwarf in 1959. Reselections of C.I. 7272 growing in a yield nursery at Columbia in 1959 varied widely in performance, but some were considerably more resistant to yellow dwarf and thus higher in yield than the parent strain. In view of the uncertainty of the future seriousness of the yellow dwarf disease in Missouri and the variability in reaction of the reselections, the decision on further increase and final distribution of C.I. 7272 has been delayed until 1960.

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*** NEBRASKA ***

by D. P. McGill, A. F. Dreier, and J. W. Schmidt; Lincoln

Nebraska produced approximately 29,326,000 bushels of oats in 1959. This is 37 percent less than the 1958 crop and 42 percent less than the average production during the ten year period 1948-1957. The acreage planted is estimated at 1,361,000 acres, the smallest since 1887.

The crop in much of southeastern Nebraska was seriously damaged by disease. The general symptoms of cereal yellow dwarf were present; however, attempts by plant pathologists and entomologists at this station to transmit the disease by certain aphid species were unsuccessful. Percentage of the leaf tissue damaged was estimated for all entries in the yield trials conducted at Lincoln. Correlations between leaf damage and yield and regression of grain yield in bushels per acre on leaf damage readings were calculated. The correlation coefficients from the Uniform North Central States Nursery and the Uniform Spring Sown Red Oat Nursery were -0.769 and -0.862 respectively. The regression coefficients from these same tests were -0.797 and -0.748 respectively. Yields and leaf damage readings for some of the more tolerant and some susceptible varieties are shown in the following table. These data are from the Variety Yield Nursery grown at Lincoln.

Yield and leaf damage data for a group of varieties grown at Lincoln, Nebraska, 1959.

Variety or selection	C.I. or selection no.	Yield per acre	Leaf damage
		Bu.	%
Dupree	4676	46.5	20
Nemaha x Richland-Fulghum	521047	37.1	30
Richland-Fulghum x Nemaha	492375	36.9	32
Tonka (Early Clinton)	7192	33.1	34
Andrew	4170	29.7	38
Newton	6642	25.0	30
Fayette	6916	8.3	70
Clintland	6701	7.9	60
Clintland 60	7234	5.4	60

Crown rust and stem rust were present only in trace amounts on oats in Nebraska in 1959.

Nehawka, C.I. 7194, was released and recommended for all sections of the state except the northeast and east central cropping districts. Burnett, C.I. 6537, was recommended for production in the northeast and east central districts. In statewide tests, Nehawka and Mo. 0-205 produced the highest average yields, 57 bushels per acre.

Small increases of C.I. 7440, Nemaha x Andrew-Landhafer (red oat type), and C.I. 7454, Clinton x /(Victoria x Hajira-Banner) x Victory/ (white oat type), were produced in anticipation of their possible release at a later date. Both have excellent yield records in eastern Nebraska.

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*** NEW HAMPSHIRE ***

by Leroy J. Higgins
(Durham)

Although New Hampshire does not grow many acres of oats for grain, the varieties selected now give better yields every year in the southern part of the State where oat yields were cut some years in the past because of disease. Generally, oats have always done well in the northern areas. In the State as a whole, more oats are pastured off or harvested alone or in mixtures for annual hay or silage or seeded as nurse companion crops than are harvested for grain.

The 1949 and 1954 statistics credit New Hampshire with less than 1,500 acres grown for grain with yields averaging slightly over 30 bushels per acre. In the same years, oat yields have averaged over 47 bushels per acre in the Uniform Northeastern Oat Nursery trials. In addition forage yields ranged from 1.78 to 3.0 tons per acre.

The average yields in the uniform rod row plots of the immediate past years have been as follows:

	1957	1958	1959	Average
Forage Tons/A	4.2	2.5	2.8	3.2
Grain Bu/A	72.5	48.7	57.0	59.0

New Hampshire has benefited in these cooperating trials throughout the years. At present Garry, and Rodney, and to a lesser extent, Ajax and Clarion can be depended on to give some response each year no matter for what purpose they are grown. This could not be said of the varieties available to farmers in New Hampshire twenty years ago, and especially in the southern half of the State.

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*** NEW YORK ***

by N. F. Jensen, G. C. Kent, E. J. Kinbacher (USDA),
W. F. Rochow (USDA), A. A. Johnson, E. Jones,
G. Gregory (Ithaca)

New York produced 32,886,000 bushels of oats from 609,000 harvested acres in 1959. The state average per acre yield was 54.0 bushels which marked the third successive year of 50-plus yields.

Oneida Oat Announced

The Cornell University Agricultural Experiment Station recently introduced the Oneida oat variety, formerly selection 618a1-1-2-12 from the cross of Goldwin x Victoria-Rainbow. Oneida has been designated as C.I. 7458. A descriptive article will appear in the March issue of Farm Research, the experiment station publication.

Oneida is the first in the planned series of varietal releases at the Cornell Station (see 1958 Newsletter). During its developmental period Oneida exhibited considerable tolerance to the black stem disease and consequently showed greater lodging resistance than Garry where this disease was a factor in production. It has a yellow kernel and is approximately of the same maturity and height as Garry. It is smut resistant and carries the A gene for stem rust resistance. It has known susceptibility to crown rust races 202 and 216. In variety yield trials Oneida has ranked second to Garry. Yields of Garry and Oneida were identical in the 1959 USDA Northeastern nurseries but in 14 in-state nurseries in 1959 Garry yielded 90.9 bushels compared with 87.0 bushels per acre for Oneida. Seed of Oneida is available for experimental testing on request.

Selection 5217a1-2B-39 Under Arizona Increase

Selection 5217a1-2B-39, C.I. 7524, from the cross of Garry (Cornell Sel. 5, C.I.6589) x Goldwin-Clinton, is the second oat in the current varietal series. It has a white kernel and is of the same maturity as Garry. It is shorter than Garry, however, and has shown excellent lodging resistance. Its present cumulative yield average is about 3.5% above Garry. This selection carries the ABC genes for stem rust resistance. It is known to be resistant to crown rust race 202 and susceptible to race 216. Seed for testing will not be available for 1960 planting.

1959 Nurseries - Selected Varieties

Variety	New York State Tests (14) Yield Bu/acre	Test wt lbs./bu.	Groat %	USDA NE Tests (9) Yield Bu/acre
Garry	90.9	34.8	72.3	67.6
Oneida	87.0	32.7	72.6	67.6
Ajax	89.0	34.3	72.8	65.1
Craig	81.7	33.5	72.1	63.4
Shield	67.3	34.3	75.7	64.0
Mohawk	64.1	34.8	74.4	59.2
Clintland 60	63.3	35.1	75.5	58.0

General Notes

Cooperative efforts between the plant pathologists and plant breeders resulted in the testing of all oat varieties and selections to stem rust races 7A and 8. A majority were tested to crown rust race 216 and a selected group to smut. These programs are considered of vital importance in the task of grooming new selections for eventual variety status.

Beginning in 1960 oat yields in the Plant Breeding cereal project will be expressed in terms of pounds of groats per acre, using data obtained with the use of the Quaker Oats dehuller. These data will be in addition to bushels per acre and pounds per acre. It is believed that the application of groat percentages to yields will have considerable effect on varietal standings.

Thirty selections from the cross of Alamo x Craig are being given special attention because of the observation that they show tolerance to BYDV.

Winter Oats

The severe winter of 1958-59 affected all rod row nurseries to the extent that no harvest was made for yield data. Differential killing made it desirable to harvest much material by hand stripping of seed. In the early generation bulk plots for selection a total of 2003 plants survived in 28 hybrid populations planted on approximately 2 acres of land. The survival ranged from zero to 7.5% in the different populations and the total average survival was estimated at 1% of normal.

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BYDV Meeting at Cornell

On July 22, 1959, Dr. H. C. Murphy visited Ithaca to discuss the barley yellow dwarf virus problem with Bill Rochow and with Henry Jedlinski, who was in Ithaca at that time to become acquainted with the USDA-New York virus program. Many of the workers with whom Murphy, Rochow, or Jedlinski cooperate in research on barley yellow dwarf virus also visited Ithaca on that day to join in informal discussions of the problem. Every person contributed freely whatever information or ideas he had regarding each different aspect of the virus or of the disease it causes. The informal, off-the-record nature of the discussion was found to be most helpful. In addition to many workers from Cornell, the following visitors took part in the discussions:

T. T. Hebert, North Carolina State College
Deane C. Arny, University of Wisconsin
Henry Jedlinski, USDA & University of Illinois
Dallas E. Western, Quaker Oats Company
H. C. Murphy, USDA, Beltsville
J. Artie Browning, Iowa State University
W. R. Richards, Science Service, Ottawa
F. J. Zillinsky, Science Service, Ottawa
W. G. Matthewman, Science Service, Ottawa
John L. Slykhuis, Science Service, Ottawa
B. F. Coon, Pennsylvania State University
Richard D. Schein, Pennsylvania State University
Harold G. Marshall, USDA & Pennsylvania State University

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Chromatographic Studies on Cold Hardened Winter Oats

The results from qualitative paper chromatography have shown that chromatographic analysis of plant material is a very fruitful approach to cold resistance studies. An increase in free amino acid content of plants accompanied increased cold resistance. Proline especially increased as the plants were cold hardened. An amino acid, that is unknown at this date (rf in phenol and water 4:1, is .840 and in butanol, acetic acid, and water, 9:1:2.9, is .125), has been found in hardened plants but not in unhardened plants. A quantitative paper chromatography technique is being developed to study the exact changes in the free amino acid content of winter oats during a given period.

E. J. Kinbacher, USDA

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*** NORTH DAKOTA ***

by H. Roald Lund, Glenn S. Smith (Fargo)

Drouth and high temperatures early in the 1959 growing season combined to produce the smallest oat crop since 1952. Yields were greatly reduced over large areas of the state, particularly the central and southern regions.

Oat production for 1959 is placed at 38,538,000 bushels compared with 75,738,000 in 1958 and the average of 51,432,000 bushels. The average yield of oats was 24.5 bushels per acre compared with the 10 year average of 27.2 bushels per acre. This was a sharp contrast to the 39.0 bushel per acre average in 1958.

Crown and stem rust infections were very light with only traces recorded late in the season. Yellow Dwarf virus damage was slight and apparently was not a factor in this seasons crop performance.

The early maturing varieties, Andrew, Ajax, Marion, Minhafer, and Ransom are recommended for the eastern and central sections of the state. The later maturing varieties, Garry, Sauk, Rodney, and Branch are recommended for the more northern areas.

An Ajax x Ransom hybrid, CI 7449, which was the top yielder in the 1959 Uniform North Central Oat Nursery, will be put out in larger plots at the Fargo NDAC Experiment Station for increase and further observation. Several crosses involving higher levels of stem rust resistance look promising.

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*** OHIO ***

by Dale A. Ray (Columbus)

Oat Production and Research in Ohio

Production

The 52 million bushel production of oats from approximately 1,136,000 acres harvested in Ohio in 1959 represented 8 per cent less bushels on 4 per cent more acreage than harvested in 1958. The 1959 spring oat seedings made excellent growth on the reserve moisture in the soil from the previous winter but oat yields and quality were reduced considerably by the extended period through June and July with no rainfall. All varieties were advanced about one week earlier in maturity than in previous years.

Nearly all winter oat seedings were destroyed by severe winter killing accompanying the excess moisture conditions prevailing through the winter season.

Oat Diseases

Oat smuts and rusts were observed generally in minor amounts, however some late-seeded fields were attacked by crown rust. Septoria blight was generally present but did not appear to seriously influence yields. Barley yellow dwarf was observed to be more widespread in occurrence and more damaging than in recent years. Local areas in fields and often entire fields, especially when seedings had been delayed or late-maturing varieties were seeded, were severely damaged.

Oat Varieties

Clintland continued as the most popular variety in Ohio and occupied over 70 per cent of the certified seed oat acreage. Rodney oats is recommended for seeding in northern Ohio and Clintland and Clarion are recommended for the entire state. Clintland 60, Newton and Goodfield performed well in the variety trials in addition to the recommended varieties. Several selections were promising but require further evaluation before consideration for release.

Dubois winter oats is acceptable for southern Ohio but all available varieties lack sufficient winter hardiness or yield potential for general recommendation.

Oat Breeding and Testing

Several spring oat crosses for improvement in crown rust resistance and straw strength were made. Selections were made from earlier crosses. Eleven crosses are being continued in bulk. Considerable head row selections from the hardy x hardy winter oat crosses provided by U.S.D.A. appear promising and will be given more extensive evaluation.

Spring oat variety trials with 20 varieties were grown at Columbus and Wooster and 10 of the same varieties were compared at three additional locations. The winter oat variety trial was abandoned at three of the four test sites due to winterkilling of all entries. The Uniform North Central States Spring Oat Nursery, the Uniform Northern Winter Oat Nursery and the Uniform Oat Winter Hardiness Nursery were evaluated at two locations, while the Uniform Red Oat Nursery was grown at Columbus only. Preliminary and advanced selection nurseries of spring and winter oat entries were each seeded at two locations.

Special studies on the influence of fertility treatment on oat quality, seed treatments in control of loose smut of oats and seasonal changes in the chemical analysis of winter oats constituted portions of graduate research programs. New studies included the production of soybeans following silage harvests of spring oat varieties, the comparison of spring seedings of winter oat varieties, and the evaluation of spring oat varieties for silage and in response to clipping treatments.

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*** OKLAHOMA ***

by B. C. Curtis, A. M. Schlehuber, O. D. Smith, R. M. Oswalt, H. C. Young, Jr., and F. E. Bolton (Stillwater)

Production and Breeding

Total oat production in 1959 (12,425,000 bushels) was 56% less than the 1958 production. This resulted from a 41% decrease in harvested acres and an average 5.5 bushels lower yield per acre.

A new spring oat variety, Tonka (C.I. 7192), was released following the 1959 harvest. Available records indicate that Tonka is superior to any presently recommended variety in Oklahoma. In addition to its high yielding ability, this strain has 3 outstanding attributes: high test weight, excellent straw strength and early maturity. It is resistant to some of the prevalent races of crown rust which, along with its early maturity, should allow it to escape serious damage from this disease. Tonka has short plump and bright yellow seed, a characteristic desired by Oklahoma farmers. Approximately 400 bushels of foundation seed were produced in 1959.

Another new winterhardy variety being grown in Oklahoma is Winter Excel which is quite similar to Wintok in many respects. This variety was released about 2 years ago by the late Mr. Joseph Danne, a private plant breeder who lived near El Reno. Preliminary tests indicate that Winter Excel may have some promise. The pedigree for Winter Excel is not known; however, this information may be among Mr. Danne's records which were recently received by the Oklahoma Experiment Station.

The production of an oat cross composite similar to those produced in barley is nearing completion. Twelve oat varieties, representing a fairly wide gene base, were selected to form the composite. These varieties are as follows:

Variety or Selection	C.I. or Sel. No.	Remarks
Wintok Ey. Sel	5849	Winterhardy, high yielder, very early
Cimarron	5106	Winterhardy, high yielder, very early 3-way oat
Forkedeer	3170	Winterhardy, high yielder, med. maturity
Arkwin	5850	Winter, stiff straw, some C. rust res.
Clintland	6701	Spring, Landhafer C. rust res., stiff straw
Tonka	7192	Spring, high test wt., early maturity
Fork. X (H.-J. X B-R)-S.F.	Stw. 553452	Winterhardy, C. rust res., med. maturity, high yielder
(Land. X Mindo X H.-J.) X And.	7145	Spring, C. and stem rust res.

Variety or Selection	C.I. or Sel. No.	Remarks
D.L.M. 3	7172	Spring, res. to Landhafer C. rust races
W. Turf X Cl.^{2}S.F.-(L.-V.-F.)	Stw.563424	Winter, stiff straw, good C. rust res., good seed type
Dubois	6572	Winterhardy, good yielder
Fork. X Land.-(Mindo X H.-J.)	Stw.553506	Winter, stiff straw, C. rust res.

These varieties were crossed in all 66 possible combinations. Equal amounts of F_1 seed will be bulked and F_2 and later generations will be grown as a composite. Seed may be available for other experiment stations following harvest of the F_2 generation in 1961. You will be informed concerning the availability of this seed through the oat newsletter.

Diseases

In 1953 and again in 1958 mention was made in the National Oat Newsletter of damage to oats in Oklahoma, particularly spring types, by what was believed to be Olpidium brassiceae. This type of injury appeared in 1959 (all of the years mentioned were wetter than normal at the time the injury appeared) and the presence of O. brassiceae in the roots was again closely associated with plant injury (stunting, yellowing and death of the leaves from the tips back and stunting of the roots). This year the organism was successfully isolated and inoculation experiments in the greenhouse showed that it was at least one of the causal agents responsible for the damage seen in the field. Root weight and root volume of a susceptible oat selection (Clintland X Mustang, Stw.572559-52) were reduced over 50 percent in the presence of this organism compared to non-inoculated controls. Further studies on the problem, particularly more definite identification of the organism and resistance tests, are being made.

State-wide Tests

Yield and test weight data for the 1959 Oklahoma State-wide Variety Test are shown in the table below. The tests were conducted in 9 counties at 12 locations in the North-northwest section and in 9 counties at 10 locations in the Southwest-east section. The major oat growing counties are represented in these tests.

Variety tests are shown as follows:

C.I. No.	Type & Variety	No. or Tests	Yield Bu/A	Test Weight	Percent of Forkedeer Yield	Percent of Forkedeer Test Wt.
	North and Northwest Okla. - 9 counties					
	Fulwin Derivatives					
6571	Bronco	12	58.9	31.3	105	98
	Winter Fulghum Sel.					
3170	Forkedeer	12	56.2	32.0	100	100
	Hardy Winter					
5106	Cimarron	12	60.8	32.0	108	100
3424	Wintok	12	51.8	32.5	92	102
	Southwest and East Okla. - 9 counties					
	Fulwin Derivatives					
6571	Bronco	10	54.1	28.4	101	100
4660	Mustang	10	63.5	28.1	99	99
	Winter Fulghum Sel.					
3170	Forkedeer	10	64.3	28.5	100	100
	Hardy Winter					
5106	Cimarron	10	60.8	29.0	95	102
3424	Wintok	10	57.0	30.5	89	107
	Miscellaneous Winter					
5850	Arkwin	10	46.8	29.4	73	103

Bronco and Cimarron continue to outyield Forkedeer in the drier North-northwest section of the state. Bronco also continues to perform well in the Southwest and East sections. In the latter sections the performance of Cimarron is reduced by susceptibility to diseases and "Cimarron blight", a physiological disease.

Personnel

Dr. A. M. Schlehuber is spending a year in Germany as a recipient of a Fulbright Fellowship Award. He is studying and lecturing at Weihenstephen near Munich. He is due to return to Oklahoma State University about September 1, 1960. Mr. Floyd E. Bolton, who received a B.S. degree in 1959, has joined our staff to assist in the small grain program during Dr. Schlehuber's absence.

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*** OREGON ***

by W. B. Raymer, Wilson H. Foote, W. E. Sieveking (Corvallis)

Oats are a major crop in Western Oregon accounting for about 200,000 acres out of approximately 1 million acres under cultivation. Since 1957 barley yellow dwarf virus (oat red-leaf) has caused serious losses in oats culminating in a loss of over 30% in 1959. In an attempt to find a resistant oat adapted to this region or a source of resistance for breeding purposes, a screening program was initiated in the spring of 1959. The first 1000 varieties of the active C.I. oat collection were planted in single 6' rows exposed to natural infection. Both English grain and apple grain aphids were abundant and 100% of the plants were infected at an early stage of growth. Victory was used as a check variety and planted every 40 rows. The varieties were rated three times through the season by a system based on vigor of the plants, discoloration and floret blasting.

Results were rather discouraging in that very few varieties exhibited any appreciable resistance. The following varieties approached or equaled but did not exceed Victory in tollerance to the virus:

Name	C.I. No.	Source
Clinton x Kanota	5032	Maryland
Colorado x Fultex	5208	Florida
D69-Bond x Fultex (Southland)	5207	Florida
Frazier	3071	Iowa
Fulghum	1833	Georgia
Fulghum	3228	New York

The Milford variety (S-225) which was not in this trial but was in the yield trials appeared to have some resistance to yellow dwarf and appeared superior to Victory.

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*** PENNSYLVANIA ***

by H. G. Marshall
(U.S.D.A. - Pennsylvania)

*** Winter Oats ***

The author assumed responsibility for the cooperative winter oat breeding program at the Pennsylvania State University in January, 1959. The winter of 1958-59 was unusually severe, and there was essentially no survival of the commercial winter oat crop in Pennsylvania. Differential killing much more severe than normal occurred in the nurseries that were seeded by Mf. F. A. Coffman near Centre Hall, Landisville, and Clearfield, Pa. A total of 95 plants survived in the nursery on the Agronomy Farm at Centre Hall. After the extent of survival was evident, these plants were moved into a spring seeded crossing block where they could be more readily cared for and were immediately available for use as parents in crosses. The transplanting was accomplished with a bulb transplanter and all plants made a vigorous recovery in the freshly prepared seedbed. Extensive panicle selections were made within varieties, lines and hardy x hardy bulks showing some survival at the other two locations.

Hybridization Program

General. An extensive crossing program was conducted during the year as the first cycle in several modified schemes of multiple crossing and backcrossing aimed at transgressive recombination of factors for winterhardiness combined with resistance to lodging and disease. Ten winter oat varieties (Tech, Bicknell, Wintok Sel., Wintok, Ballard 6980, Nysel, Dubois, Fulwin, Stanton, Hairy Culberson) were selected as parents on the basis of winterhardiness and/or diversity of origin and crossed in essentially all possible combinations. They were also crossed with several stiff-strawed and/or disease resistant spring varieties. Certain of the 95 surviving plants mentioned above were also used in crosses, primarily to the spring varieties. A total of 857 seed, representing over 200 combinations including reciprocals, were obtained from these efforts. An average seedset of 39% was obtained under greenhouse conditions and 41% under field conditions. The latter is the combined average for the author and Mr. Barry Weaver (formerly Laborer, U.S.D.A.) who aided with the crosses in the field.

Possible crossing aids. Since oat crosses are generally considered relatively difficult, a few comments regarding the above seedset may be of interest. The author enjoyed similar results with several hundred crosses while a graduate student at the University of Minnesota, and believes a simple variation in technique may be in part responsible. It has been a practice to emerse the parchment bags, used to cover the panicles, in water so as to wet them thoroughly on both sides prior to replacement after pollination. This technique has apparently been a definite aid to obtaining crossed seed under greenhouse conditions or in the field when temperatures were unfavorably high and/or humidity low at the time of pollination. This "wet bag" technique probably results in a somewhat higher humidity and somewhat lower temperature in the vicinity of the florets for sometime after pollination. However, this practice appears to be ineffective when temperatures become extremely high and the bags dry rapidly following pollination. It may be possible to utilize shade on hot, clear days and further improve seedset. On one such day at the end of the crossing season last summer, a seedset of 38.1% was obtained with the wet bag alone and 70.4% when the plants were shaded in addition for several hours following pollination. Since the emphasis in the past has been on obtaining seed, a good comparison of dry bag vs. wet bag under the same conditions is not available. An experiment is currently underway using controlled conditions to ascertain the effect of this technique.

Interspecific crosses. Several introductions of A. byzantina were selected from the world collection on the basis of previous survival under Pennsylvania conditions and crossed to certain of the winter varieties previously mentioned. These varieties may contribute factors for winterhardiness different from those of more commonly used parents.

Plants possessing crown rust resistance apparently transferred from the derived tetraploid Ab. 101, C.I. 7232, (Coffman, F. A. Plant Dis. Reptr. 43: 772-776. 1959) were crossed to most of the winter varieties previously mentioned and to a number of the 95 survivors at Centre Hall. Seed was also obtained from crosses of Ab. 101 with Dubois, Clintland[5] x LMHJA (C.I. 7451), Clintland 60 and Black Mesdag. Attempts will be made to utilize these hybrids in further crosses, primarily to winter varieties.

Winterhardiness Studies

Studies designed to provide information relative to the nature of winterhardiness and effective methods of screening and evaluating material in the cold chamber and field are underway. An experiment was initiated in the fall of 1959 using material grown and hardened in the field under natural conditions for freezing tests in a cold chamber. The hardening process as indicated by survival in these tests is being followed into the winter. Information obtained should be applicable to chamber tests (using either field or growth chamber hardened material) for screening breeding material. Preliminary observations indicate that freezing treatments required to produce a differential kill of field hardened material are considerably more severe than those that have been used by other investigators on material hardened in growth chambers. The importance of the level of hardiness relative to ranking of lines and varieties in freezing seems to be uncertain. A graduate student, Mr. Gerald A. Porter, will include certain aspects of this problem in his thesis research as part of the requirements for the M. S. degree.

*** by B. F. Coon (University Park) ***

The world collection of oats is being screened by subjecting the varieties to populations of the English grain, apple grain, corn leaf, and rose grass aphids. Varieties which show resistance to the feeding of these aphids will be subjected to further tests to identify the varieties with greatest degree of resistance to feeding and to antibiosis. Approximately 1000 varieties have been tested. A number of varieties are showing resistance worthy of further evaluation.

An aphid trapping procedure has been carried out in Pennsylvania for two years using black light, air, water, and sticky traps. These data are now being evaluated. Plans for 1960 include an extension of the trapping site to cover 10 states from South Carolina northward to Ottawa, Canada. Cooperators in these states and Canada will submit aphid catches to the Pennsylvania State University for identification of the cereal aphids. Black light traps of identical design will be used at each location.

Varieties of oats have exhibited various degrees of tolerance or resistance to the Barley yellow dwarf virus disease in various areas of the United States. Whether this reaction is a result of resistance to the virus, to a non-expression of virus symptoms, or resistance to aphid feeding will be unknown without being tested with the aphids. Those cereal workers having varieties which should be evaluated for resistance to aphid feeding and antibiosis are invited to contact the writer or to send 5-gram samples to him at the Pennsylvania State University. The varieties will be tested and the results reported to the investigator submitting the test varieties.

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*** SOUTH CAROLINA ***

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

The 1958-59 oat crop in South Carolina was again threatened by those diseases which have been prevalent in the past several years with the leaf disorders probably causing the most damage. It is generally assumed that red leaf (Barley Yellow Dwarf) is the major cause of the losses sustained in the crop. The situation is confused, however, by the wide variation in symptoms observed, ranging from pale yellow to deep red symptoms.

Early plantings of susceptible varieties in the fall of 1959 (1959-60 crop) were damaged by "Victoria" blight. In the breeding nurseries a severe epidemic of crown rust had developed by late October. Also, by mid November the leaf disorders, red leaf, etc., were very pronounced on the susceptible varieties in the yield tests. The same varieties and selections reported to be resistant to the chlorotic conditions in 1957 (Plant Dis. Reptr. 42: 517-520) are showing little or no symptoms. Of particular interest are Arlington and the selections from the cross, Arlington x (Wintok x Clinton^2 - Santa Fe).

Mosaic Inheritance Study

Bruce W. Byrd, Jr., graduate assistant has completed a study on the inheritance of resistance to soil-borne mosaic which was submitted as a dissertation for the degree of Master of Science in Agronomy. The results indicate that resistance is conditioned by multiple factors with estimates of number of gene pairs for four crosses studied ranging from 4 to 9. Also, it was evident that the environment (variability in the degree of soil infestation, etc.) was a major factor in the classification of genotypes.

Recommended Varieties

The following oat varieties are recommended for planting in South Carolina for grain production:

Piedmont	Coastal Plains
Arlington	Arlington
Moregrain	Moregrain
Victorgrain 48-93	Suregrain
	Victorgrain 48-93

Also, Arlington and Moregrain are recommended as the best for grazing.

Personnel Change

Dr. R. W. Earhart, small grain pathologist, left his position at Clemson on October 31 to join the research staff of "Chemagro" at Kansas City, Missouri. A replacement has not been selected to fill the vacancy.

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*** TENNESSEE ***

by N. I. Hancock (Knoxville)

A program was begun this past year on crosses between the spring type, hexaploid derivatives of A. strigosa and our winter types. Thirty-four desirable derivatives were sent us by Dr. Ward. These were planted in nursery in late February. Considerable leaf rust was observed on some of the lines in early June and collections were sent Dr. Simons. Race 295 was the predominating one. The following C. I. numbers were susceptible; 2057, 2895, 3032, 3033, 3034, 4508, 4636, 5105, 6665, 7147, 7181, 7250, and P. I. numbers 174513, 174544, 174545, 185783, 186269. None of these 34 lines had much strength of straw. Successful crosses were obtained on C. I. numbers 7010, 7171, 7172 resistant lines as well as 2052, 2895, and P. I. number 174544 which were susceptible.

Release of a Variety

In this state the variety must be passed upon by a committee of 14 before it is subject to release by the Director of the station. This committee is composed of 6 Plant Breeders, representing 5 different crops, 4 Extension Specialists and 4 Field Crops Research Personnel. A ballot is taken after the breeder has presented data and given reasons for release of variety. The results of this balloting are turned in to the Director and the breeder does not know the individual who voted for or against his new introduction, or why. Obviously, under such a situation the cotton personnel know very little about the tobacco variety which may be up for consideration, yet their vote counts for as much as those who know something about tobacco, and vice versa. We would like to know the procedure other states follow in releasing a variety.

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*** TEXAS ***

by I. M. Atkins and M. C. Futrell (College Station)

Oat acreage seeded for the 1959 crop was 2,206,000 acres, which is about 400,000 acres greater than the average of the past ten years but less than the 1958 crop. Owing to severe winter and spring drought throughout the Rolling Plains area and much of Central Texas, the harvested acreage was reduced to 1,098,000 acres. Total production was 24,156,000 bushels or an average of 22 bushels per acre. Large acreages sown exclusively for winter pasture do not appear in these statistics.

State yield trials were grown at 18 locations with satisfactory data obtained at all but three stations. Spring seeded oat tests were a near failure owing to severe drought conditions. Suregrain and Moregrain were again among the leading varieties in yield in Central and South Texas and these varieties were placed on the recommended list. Several of the new short stature oat strains from the cross of (Fulwin-Lee-Victoria 3826 x Red Rustproof Backcross, C. I. 4062, Texas Selection 145-44-43) x (Bond-Rainbow-Hajira-Joanette x Landhafer, Minn. II-47-4) produced high yields this year.

Three strains obtained from irradiated Alamo oats, which combine resistance to race 216 and 290 with resistance to Helminthosporium blight, were increased at Aberdeen, Idaho this summer. One may be released to replace Alamo.

Diseases were of minor importance in grain production as dry weather in Central Texas and a cool spring prevented spread of the rusts out of the over-wintering area south of Austin. Oats grown for forage and grain in South Texas were damaged by crown rust and the livestock grazing period was shortened. The crown rust race 216 group again predominated in Texas although special reports on collections show that races 290 and 264 were present at Beeville and at Rio Bravo, across from Weslaco, Texas. The damage caused by race 216 at College and Prairie View and by race 216, with a small proportion of race 290 at Beeville, is illustrated by the yields of isogenic lines given below. These large yield reductions occurred in an area where oats are largely grown for winter pasture.

Yields of Isogenic Lines of Oats Resistant and Susceptible to Crown Rust at Texas Location, 1959

		College Station		Prairie View		Beeville	
Strain	Reaction	Grain yield bu.	Percent rust	Grain yield bu.	Percent rust	Grain yield bu.	Percent rust
57C1447	S	43.8	55	22.8	100	8.8	100
57C1446	R	45.4	2	33.7	Tr	18.8	25
57C1449	S	45.4	58	22.4	100	8.2	100
57C1453	R	50.9	Tr	34.6	Tr	19.4	25
57C1461	S	35.7	69	13.6	100	5.1	100
57C1462	R	40.2	1	19.9	Tr	13.1	25

Yellow dwarf was observed in a number of fields in Texas this season. Several species of aphids capable of transmitting the disease were numerous. Abnormal yellow spots in certain of Central Texas fields were first believed to be caused by a virus but later tests prove these were caused by nutritional disturbances.

Dr. Paul E. Pawlisch, a graduate of the University of Wisconsin, joined the Staff at Texas A & M College September 1, 1959 to assist in the small grain research program with responsibility for forage and disease studies on oats and barley in the southern part of the State.

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by J. H. Gardenhire (Denton)

In general, climatic conditions were unfavorable for oat production in the North Texas area. The total rainfall from October 1, 1958 to June 1, 1959 was only 9.65 inches. The normal rainfall for this period is 22.54 inches. The only nursery material to produce grain was sown on land that had been fallowed the previous year. The fall-sown drill strips, head hills and the spring-sown nursery, which were sown on land that had been in corn and cotton the previous year, were complete failures.

A low of 6° F on January 4 destroyed a considerable part of the nursery. Only the more winter types, such as, Bronco, Mustang and equally hardy strains, were not injured. The stands of the Red Rustproof types were reduced from 5 to 25 percent.

A number of strains from the cross Sel. 145-44-43 x Minn. II-47-4, were selected at College Station, Texas, and sown here for their reaction to winter-killing. Only a few strains survived the freezing temperature and these were found to be susceptible to crown rust.

A numberof spaced F_2 plants from the cross C.I. 2898 x (RRP x V-RX Ranger) were harvested and will be screened in the insectary for their reaction to the greenbug as soon as space is available. C.I. 2898, Russian 77, is a late maturing red oat that was found to have considerable tolerance to the greenbug. Several other crosses have been made and will be tested along with the above mentioned material.

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*** WISCONSIN ***

*** Wisconsin State Yields and Variety Performance ***

by H. L. Shands, R. A. Forsberg and L. G. Cruger (Madison)

The growing season of 1959 was near the average in many respects, being neither highly favorable nor unfavorable, except for generally poor harvest conditions. The state average yield of 50.0 bushels per acre is about four bushels higher than the previous 10-year average; yet eight bushels lower than the all-time high average yield in the unusually favorable year of 1958.

Bushel weights were generally satisfactory since most varieties have medium or high bushel weight. In some instances, quality of grain for seed and feed was damaged in storage because of high moisture and heating in the bin. According to the Wisconsin Crop Reporting Service, the percentage acreage of the leading oat varieties in 1959 was as follows: Beedee, 24; Sauk, 19; Clintland, 13; Branch, 10; and Ajax, 7. Greatest change from 1958 was a seven percent increase by Beedee. This variety will probably increase further in 1960.

"Red leaf" of oats, originally described as "yellow-dwarf" in barley, was present in most areas of the state. Adjoining areas five to ten miles in diameter varied in degree of red leaf symptoms indicating spotty damage. Central and northern Wisconsin had a higher proportion of crop damage by red leaf. Fortunately, some of the commonly grown varieties in Wisconsin, like Beedee, Ajax and Garry appeared to be somewhat tolerant to red leaf and, therefore, yielded moderately well. Newton, Portage and X560-2 (C.I. 7372) also showed tolerance. Clintland, Clintland 60, Minhafer and Fayette had more yield loss from red leaf than varieties mentioned above.

Crown rust was prevalent in southern counties and reduced yields and bushel weights in some fields. Volunteer oats late in fall showed high natural infection.

Halo blight, a bacterial disease, was more prevalent than usual early in the season and caused concern of some growers. In all but the most severe cases, the plants grew out of the disease later in the season.

Variety Performance

The Wisconsin Seed Certification Service provided yield reports for varieties certified in Wisconsin. Paired comparisons were less than previous years, and therefore, will not be tabulated. Average yields are listed below on a non-paired basis.

Table 1. Seed growers' reports of non-paired yields of oat varieties in Wisconsin in 1959.

Variety	No. of Growers	Yield in Bu/A	Variety	No. of Growers	Yield in Bu/A
Ajax	14	45.6	Fayette	6	45.0
Beedee	70	51.9	Garry	27	52.4
Branch	19	46.3	Goodfield	46	48.0
Burnett	57	49.6	Minhafer	89	48.7
Clintland	27	46.8	Sauk	23	46.1

Garry had .5 bushel advantage over Beedee for 27 reports compared with 70 for the latter. However, all yield reports are probably lower than was actually had since the seed growers tend to be conservative, because their advanced charges for certification costs are based on their yield estimates. All varieties had lower yields than in 1958, which is to be expected in a less favorable year.

Goodfield, C.I. 7266, is a newcomer in the varieties certified in Wisconsin. About 75 growers received seed of this variety in the spring of 1959. Growers were chosen on the basis of their previous usage of Clintland and Fayette since it was thought that these varieties were growing on soils best adapted to Goodfield. The seed supply of Goodfield was limited and, partly because of out-of-state interest, prices were much above that of other varieties.

The Wisconsin Experiment Station expects to distribute a new variety of oats to growers of certified seed. C.I. 7107, X456-4, has been named "Portage". It is from the cross Ajax x Hawkeye-Victoria. The first cross was made in 1935 and the second in 1947. The breeding was done cooperatively by workers at the University of Wisconsin and the United States Department of Agriculture, with support by the Quaker Oats Company.

Yields of Portage have been high in Wisconsin tests. Straw is tall and of medium to good strength. Bushel weight is high and hull color is almost white.

Portage has the "A" gene conditioning stem rust reaction and has received low crown rust readings in Wisconsin tests. According to the 1957 report of Coffman, Murphy and Stevens, Portage is susceptible to races 203 and 264, but resists 216 and 290. Stem Septoria is higher than for Ajax or Branch, but not as high as for Fayette or Garry. Portage probably will compete for acreage with Branch and Ajax.

Quite a number of graduate students in small grain breeding at Wisconsin, as well as the writers, helped in the development of Portage. D. C. Arny (staff member), A. R. Brown, R. W. Earhart and M. N. Grant were in on testing progenies of the first cross, especially for H. victoriae response. C. M. Brown, Steve Lund, L. N. Barker, P. E. Pawlisch, D. C. Hess, M. L. Kaufmann, E. A. Brickbauer and Z. M. Arawinko, the latter two staff members, helped in testing the second and final cross. Branch Experiment Station workers also assisted in testing Portage in the final phases.

Selections of current interest are C.I. 7377, C.I. 7453 and C.I. 7269, all from the same cross as Goodfield.

Personnel Items. Graduate assistants in the small grain breeding work are R. A. Forsberg, L. G. Cruger, L. N. Barker and D. C. Hess. P. E. Pawlisch received the Ph.D. degree in August and is now at Texas A. and M. T. T. Lee received the M.S. degree in August and is now doing graduate work in the Botany Department.

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*** Inoculation Methods and Pathogenicity of Various Collections of Oats Smut ***

by D. C. Arny (Madison)

During the period 1938-40, H. L. Shands compared the dehulling-dusting and vacuum methods of inoculation. The dehulling method gave somewhat higher infection, 29.6 per cent, as compared with 20.5 for the vacuum.

In 1959 the Waring Blendor, vacuum and dehulling-dusting methods were compared. Results for 23 varieties of various reactions indicated that the Blendor gave the highest average infection, but the lowest stand, while the vacuum gave the lowest infection and the highest stand. The dehulling method was intermediate in both respects.

	Blendor	Vacuum	Dehulling
Per cent infection	26	19	23
Per cent stand	50	67	63

There was no apparent interaction between method and variety. Since the number of kernels used can be easily increased, the Blendor method should be best for varietal testing and also for testing smut collections.

Several smut collections have been found which have given rather high smut infections on Clintland 60. These collections also were pathogenic on Anthony, Black Diamond, Gothland and Victoria. Two of them were pathogenic on Nicol and 2 others gave some infection on Markton.

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V. NEW OAT VARIETIES*

*Includes selections tentatively designated or under consideration for varietal release.

VI. C.I. NUMBERS ASSIGNED DURING 1959

*** New Entries in the World Collection ***

by J. C. Craddock & F. A. Coffman
U.S.D.A.

A total of 101 new accessions were received in 1959, and seed of each was added to the World Collection. This compares with 44 entries received in 1958. As usual most of the entries resulted from State or Federal oat breeding programs in the United States, although a few entries were received from Canada. Seed of entries was received from each of 19 States and from each of 3 provinces of Canada.

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Number	Designation	Source
7436	Ga. 50: Erban x Boone	Guelph. Ont.
7437	(Minn. 0-200-10: Haj.-Joan x Bond-Rain.) x Southland	Fla.
7438	Hajira x Banner: R. L. 524-1	Winnipeg, Mon.
7439	Cherokee x (And.-Land): Nebr. Sel. 56394	Nebr.
7440	Nemaha x (And.-Land): Nebr. Sel. 56411	Nebr.
7441	(Land. x Clinton^{4}:C.I. 6700) x Osage-[(Bonda x Hajira-Joanette) x Santa Fe]: Sel. '57 Ab.-2540	U.S.D.A. - Ida.
7442	(Land. xClinton^{4}:C.I. 6700) x Osage-[(Bonda x Hajira-Joanette) x Santa Fe]: Sel. '57 Ab.-2547	" "
7443	Osage x [(Bonda x Haj.-Joan.) x Santa Fe] x Clintland: Sel. '57 Ab.-2411	
7444	Osage x [(Bonda x Haj.-Joan.) x Santa Fe] x Clintland: Sel. '57 Ab.-2570	" "
7445	Overland x [(Bonda x Haj.-Joan.) x Santa Fe]-Osage: Sel. '57 Ab.-2660.	" "
7446	[(Bonda x Haj.-Joan.) x Santa Fe] x Mo.0-205:Sel. '57 Ab.-2692	" "
7447	[(Victoria x Haj.-Bann.) x (Victory x Haj.-Ajax)] x Mo. 0-205^{2} Mo. Sel. 04773	Mo.
7448	[(Victoria x Haj.-Bann.) x (Victory x Haj.-Ajax)] x Mo. 0-205^{2} Mo. Sel. 04769	"
7449	Ajax x Ransom: N.D. 55. 3A-1-40-1-1	N. D.
7450	(Beaver x Garry-Clinton) x Clinton: Mich. 53-14-808	Mich.
7451	Clintland^{5} x [Land.-(Mindo x Haj.-Joan.) x Andrew]: Pur. 5650A2-3	Ind.
7452	Clintland: Irradiated Selection Iowa A299	Iowa
7453	Clintland x (Garry x Hawkeye-Victoria):Wis. X643-41	Wis.
7454	Clinton x [(Victoria x Haj.-Bann.) x Victory]:Nebr. 521451	Nebr.

Number	Designation	Source
7455	Rodney x (Santa Fe x Clinton[3]): Wis. X572-1	Wis.
7456	/(Victoria x Haj-Bann.) x Spooner/ x Ransom:ND 55. 1A-1-19-1-1	N. D.
7457	Clinton[5] x /Land.-(Mindo x Haj.-Joan) x Andrew/: Pur. 5650 A1-2	Ind.
7458	Goldwin x (C.I. 4192:Victoria-Rainbow):Cornell 618a-1-1-2-12	N.Y.
7459	/(Bonda x Haj.-Joan.) x Santa Fe/ x Marion: Sel. '57 Ab.-2702	U.S.D.A. - Ida.
7460	/C.I. 6740: Wintok x (Clint.[2] -Santa Fe/ x Improved Garry: Sel. '57 Ab.-2720	" "
7461	(Clinton 59[6] x Landhafer) x R.L. 2120:Pur.Sel. #5130 A7-1-3-8-3	Ind.
7462	(Clintland 60[2] parent x Mo. 0-205):Pur. #541413-SP	"
7463	(Clintland 59[7] x Landhafer) x Milford:Pur.Sel. #5328 A3-4P-2	"
7464	(C.I. 5962) x (Clinton 59[7] x Landhafer):Pur.Sel. #5243 RB1-8-2-1	"
7465	(C.I. 5962) x (Clinton 59[7] x Landhafer):Pur.Sel. #5243 RB1-22-1	"
7466	Mo. 0-205 x(Clintland 60 parent):Pur.Sel.#5348 E1-7-2P	"
7467	/Land.-(Mindo x Haj-Joan) x And./ x Clintland:Minn #II-53-76	Minn.
7468	/Land.-(Mindo x Haj-Joan) x And./ x Clintland:Minn #II-53-79	"
7469	/(Vict. x Haj.-Bann) x (Victory x Haj.-Ajax)/ x Mo. 0-205[2]: Mo. 04773	Mo.
7470	/(Vict. x Haj.-Bann) x (Victory x Haj.-Ajax)/ x Mo. 0-205 : Mo. 04769	"
7471	/Garry x (Santa Fe x R.L. 1942)/ x R.L. 2228:S.D. #RROII 58-2	S.D.
7472	/Garry x (Santa Fe x R.L. 1942)/ x R.L. 2228:S.D. #RRO II 58-3	"
7473	/Garry x (Santa Fe x R.L. 1942)/ x R.L. 2228:S.D. #RRO 58-4	"
7474	/Garry x (Santa Fe x R.L. 1942)/ x R.L. 2228:S.D. #RRO 58-5	"
7475	/Garry x (Santa Fe x R.L. 1942)/ x R.L. 2228:S.D. #RRO 58-9	"
7476	Zanster:-Adelaar x Dippe's Early White /From Holland/	Ottawa
7477	Eagle x Holmberg:Sel. 13-11 /From Agassiz, B.C./	Ottawa
7478	/R.L. 1574:(Victoria x Haj.-Bann.) x Victory-Haj./ x Ripon: Sel. 48-54 /From Agassiz, B.C./	"

Number	Designation	Source
7479	/R.L. 1574:(Victoria x Haj.-Bann.) x Victory-Haj./ x Ripon:Sel. 50-250 /From Agassiz, B.C./	Ottawa
7480	Wintok Sel. x Hairy Culberson:Elite Hardy '58-66	U.S.D.A. - Ida.
7481	Hairy Culberson x Nysel: Elite Hardy '58-82	" "
7482	Hairy Culberson x Nysel: Elite Hardy '58-94	" "
7483	Traveler^2 x Bicknell: Ky. 56-302	Ky.
7484	Wintok x (C.I. 4316: Lee-Victa x Fulwin):Ky.56-527	"
7485	Wintok x (C.I. 4316: Lee-Victa x Fulwin):Ky.56-518	"
7486	Cimarron x Traveler: Okla. 563207	Okla.
7487	Forkedeer x /(Haj-Joan x Bond-Rain) x Santa Fe/: Okla. 5-53422	"
*7488	Arlington x (Wintok x Clinton^2 -Santa Fe):S.C. 57-167	S.C.
7489	Nysel x Hairy Culberson: Mo. 04833	Mo.
7490	Nysel x Hairy Culberson: Mo. 04834	"
7491	Nysel x Hairy Culberson: Mo. 04835	"
7492	Hairy Culberson x Nysel: Mo. 04778	"
7493	Hairy Culberson x Nysel: Mo. 04780	"
7494	Hairy Culberson x Nysel: Mo. 04781	"
7495	Cimarron x /Haj-Joan x (Atlantic x Clinton^2 - Santa Fe)/: Mo. 04831	"
7496	Cimarron x /Haj-Joan x (Atlantic x Clinton^2 -Santa Fe)/: Mo. 04832	"
7497	Wintok x (Clinton-Hairy Culberson): Mo. 04783	"
7498	Black Mesdag x (Aberdeen 101:Derived tetraploid C.I. 7232)	U.S.D.A. - Ida.
7499	Wintok Sel. x Hairy Culberson:Md.-Pa. '58 J.H.1	" "
7500	Wintok Sel. x Hairy Culberson:Md.-Pa. '58 J.H.3	" "
7501	Wintok Sel. x Hairy Culberson:Md.-Pa. '58 J.H.16	" "
7502	Wintok Sel. x Hairy Culberson:Md.-Pa. '58 E.H.67	" "
7503	Hairy Culberson x Nysel: Elite Hardy '58 83	" "
7504	Hairy Culberson x Nysel: Elite Hardy '58 84	" "
7505	Hairy Culberson x Nysel: Elite Hardy '58 92	" "
7506	("Ballard":Pentagon Sel. C.I. 6980)xC.I. 6700-/Osage x(Bonda x Haj-Joan)-Santa Fe/:Belt. '58 Sel. 4211	" "
7507	("Ballard":Pentagon Sel.C.I. 6980) x C.I. 6700-/Osage x (Bonda x Haj-Joan)-Santa Fe/:Belt. '58 Sel. 4232	" "
7508	(Anth. x Bond-Boone)x(Tennex-Victoria x Hajira-Bond): Tex. 225-52-4	Tex.
*7509	Arlington x /Wintok x (Clinton^2 Santa Fe)/	S.C.
7510	Victorgrain 48-93 x Suregrain: Coker's '59-12	"
7511	Victorgrain 48-93 x Suregrain: Coker's '59-15	"
7512	Victorgrain 48-93 x Suregrain: Coker's '59-17	"
7513	Letoria x (Clinton^2 x Santa Fe):N.C. 64	N. C.

*Unfortunately two numbers, C.I. No's. 7488 and 7509 were assigned to the same oat.

Number	Designation	Source
7514	Fulgrain 3-Arlington x Suregrain:/Coker's 57-15/: Coker's 59-24	S. C.
7515	C.I. 6666 x Arlington:Miss. Delta 54168 p. 3	Miss.
7516	/(RRxV-R)x Sib. C.I. 4316/ x (Clinton^2 x Santa Fe): '56-2081	U.S.D.A. - Ida.
7517	/(RRxV-R) x Sib. C.I. 4316/ x (Clinton^2 x Santa Fe): '56-2083	" "
7518	Beaver x Clinton 59: Me. Sel. P.I. 590	Me.
7519	(Clintland 60 parent) x Mo. 0-205:Pur. 5348E1-7-2P	Ind.
7520	Craig x Alamo: N.Y. 5271 a B-2B-5	N. Y.
7521	Craig x Garry 5: N.Y. 5174 r B-2B-50	"
7522	Garry 5 x (Craig x Ajax): N.Y. Sel. 5216 a 2-B-57	"
7523	Garry 5 x (Craig x Ajax): N.Y. Sel. 5216 a 2-B-73	"
7524	Garry 5 x (C.I. 6940: Goldwin x Clinton):N.Y. 5217a1-2B-39	"
7525	Garry 5 x (C.I. 6940: Goldwin x Clinton):N.Y. 5217a1-2B-71	"
7526	Garry 5 x /(C.I. 7211:Goldwin x Victoria-Rainbow) x Branch/:N.Y. Sel. 5220a2-B-61	"
7527	Garry 5 x /(C.I. 7211:Goldwin x Victoria-Rainbow) x Branch/:N.Y. Sel. 5220a2-2B-5	"
7528	Garry 5 x /(C.I. 7211:Goldwin x Victoria-Rainbow) x Branch/:N.Y. Sel. 5220a2-2B-23	"
7529	(Ottawa 3928-5-8:C.I. 5962) x (Clinton 59^2 x Landhafer):Pur. Sel. 5243RB1-8-2-1	Ind.
7530	(Ottawa 3928-5-8:C.I. 5962) x (Clinton x Bond):Pur. Sel. 549B3-1-1	Ind.
7531	Putnam^4 x/Landhafer-(Mindo x Haj.-Joan) x Andrew/: Pur. Sel. 5638 G-1-5	"
7532	Arlington x (Wintok x Clinton^2 -Santa Fe):Sel. Ab. '57 3007	U.S.D.A. - Ida.
7533	Arlington x (Wintok x Clinton^2 -Santa Fe):Sel. Ab. '57 3048	" "
7534	Arlington x (Wintok x Clinton^2 -Santa Fe):Sel. Ab. '57 3088	" "
7535	(Goldwin x C.I. 4192) x (Garry^5 xCraig):Sel. 5201a1-B-1	N.Y.
7536	/Landhafer -(Mindo x Hajira-Joanette)/ x Andrew:Minn. 53 Ag. 354	Minn.

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VIII. APPENDIX

Dear Editor:

I have been disturbed for sometime by the smugness with which we use the statement on the front of our small grain newsletters "The data presented here are not to be used in publications without the consent of the authors," or some variation of this. It is much like the matron at the bridge party who upon relating a choice bit of information ends with the statement, "<u>But don't tell anyone</u>."

We should clearly realize that any publications or articles that are printed, circulated, and deposited in libraries are in fact published, and <u>unless copyrighted</u>, are available to anyone to use or to quote freely as they wish regardless of any statement to the contrary which the editors print on the titlepage.

The statements have been effective because distribution of newsletter has been largely "closed-shop", that is to research workers on public payrolls (although not entirely so) who respect their colleagues wishes with utmost integrity. (Or perhaps there has been very little in them that one would quote.) Certainly there has been very little in them which could not be quoted without harm.

The arguments for the restricted policy has been that research workers can report on research that is tentative and can, in most cases I presume, write and submit a note to these newsletters without the formality of obtaining permission from their Experiment Station Directors or superiors.

But the same ease of publication also fosters immature and irresponsible statements because the policy of the newsletters has been to surround the authors in a cloak of "apparent" immunity. That so few irresponsible statements are found in the newsletters is a tribute to the integrity of the contributors.

I submit that a much sounder policy for the newsletters would be a statement such as that printed on the front of the Plant Disease Reporter. I quote, "These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact."

The advantages of a statement of this type are as follows:

1. It gives the contributor as much freedom to discuss unfinished research as our present policy.

2. Since the author may be quoted the responsibility is placed upon him to make clear in his contribution that the results are only tentative, a responsibility he does not need to assume personally under our present policy.

3. It would permit readers to relate and quote if desirable from notes printed in the newsletters as well as to just utilize the information.

4. It would encourage contributors to "publish" additional short notes or articles which they wish to direct to the readers of a particular newsletter, but which may be too specific to attract interest in a publication with readers of broader interests.

5. It would permit research workers and their projects to receive credit for notes printed in the newsletters by their respective institutions.

6. It would permit and encourage wider distribution, including distribution to research workers in private companies who are entitled to be kept abreast of research developments in public institutions just as the growers are entitled to receive the final products of these public researches.

I trust you will consider this proposal seriously and perhaps bring it to the attention of your readers and contributors in some appropriate manner.

Sincerely yours,

Signed: J. M. Poehlman
(Columbia, Mo.)

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