Neal F. Jensen

1961

OAT NEWSLETTER

Vol. XII

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March 1, 1962

Sponsored by the National Oat Conference

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Vol. 12

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, 1962

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	5
1953	4	3
1956	7	20
1958	9	10
1960	11	52

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At the request of several persons I would like to express our appreciation to the Quaker Oats Company, and Dallas Western in particular, for their generous and continued support which has made this twelfth issue and others before it possible.

N. F. Jensen

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CONTENTS

TABLE OF CONTENTS (cont'd) Page

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I. CONFERENCE AND REGIONAL NOTES

*** Report from Chairman of National Oat Conference ***

The activities of the National Oat Conference during the past year were devoted largely for the meeting which was held at the University of Florida on January 24 and 25, 1962. About 80 persons attended the meeting representing all of the regions of the United States, Canada, Colombia, Mexico, New Zealand, and Puerto Rico. Significant actions of the conference are reported in the minutes reported in the 1961 Newsletter.

The North Central group and Southern group met on the evening of January 23 just prior to the National Oat Conference. Reports of the activities of sectional groups will appear in the Newsletter.

Dr. John Grafius of Michigan State University was elected to be the new Chairman of the National Oat Conference.

W. H. Chapman, Ex-Chairman

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

No meetings of the Executive Committee of the National Oat Conference were held during 1961 although after correspondence with the Executive Committee, the Chairman, W. H. Chapman, made plans and arranged for the National Oat Conference to be held January 23-25, 1962, in McCarty Hall, University of Florida, Gainesville, Florida. The minutes for that conference appear elsewhere in this number of Oat Newsletter.

On request from W. H. Chapman, received late in 1961, the secretary [as per custom] mailed to each committee member a request for his nomination for a new chairman to succeed W. H. Chapman, whose period as chairman would expire at the end of the conference to be held at Gainesville. Three members of the committee were nominated. On receipt of all nominations, a ballot was prepared by the secretary. Early in January 1962, the ballot was mailed to each committee member to enable him to make his preference known.

Among others, Neal F. Jensen was again nominated, but he again indicated that his name should be withdrawn since he had already served one term as chairman.

Votes of the members of the Executive Committee of the National Oat Conference indicated that John E. Grafius had received more votes than any other nominee and as a result, he was duly notified of his election by the chairman. As is the custom, the retiring chairman announced the result of the election near the end of the last session of the Gainesville conference, January 25, 1962, and called the newly elected chairman to come forward to be introduced and installed.

Hence, Dr. John E. Grafius, of the Michigan State University, East Lansing, Michigan, is the newly elected Chairman of the Executive Committee of the National

Oat Conference and is thus expected to serve until after/the next National Oat Conference, which will probably be held in 1964 or early in 1965.

The members of the Executive Committee of the National Oat Conference as of February 1, 1962, are as follows:

Northeastern Region:	Neal F. Jensen and Steve Lund
North Central Region:	John Grafius (Chairman), Fred Patterson, and Dale A. Ray
Western Region:	Harland Stevens and Calvin Konzak
Southern Region:	T. M. Starling and W. P. Byrd
Cereal Branch Representative:	L. A. Tatum
Oat Section Representative:	H. C. Murphy
Editor of Oat Newsletter:	Neal F. Jensen
Secretary:	Franklin A. Coffman

Franklin A. Coffman
Secretary to Committee

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*** The Oat Monograph - "Mission Accomplished" ***

The monograph, "Oats and Oat Improvement", originally outlined at a meeting of the oat monograph committee held at Ames, Iowa, November 9, 1955, appeared in print in July 1961.

The oat monograph committee included W. H. Chapman, K. J. Frey, Neal F. Jensen, H. C. Murphy, H. L. Shands, and Franklin A. Coffman (chairman), who was elected Editor of the proposed monograph.

As published, "Oats and Oat Improvement", (cloth bound) includes 15 chapters, 650 papges, with 138 illustrations, and a literature list of approximately 1,750 entries.

Those contributing to chapters were:

O. T. Bonnett	A. A. Johnson
Ralph M. Caldwell	H. C. Murphy
W. H. Chapman	Joseph G. O'Mara
R. G. Dahms	H. L. Shands
K. J. Frey	M. D. Simons
W. R. Graham	T. R. Stanton
Neal F. Jensen	Dallas E. Western
Franklin A. Coffman	

Publication was by the American Society of Agronomy and orders for or questions regarding the book should be directed to the American Society of Agronomy, 2702 Monroe Street, Madison 5, Wisconsin, U.S.A. The price of "Oats and Oat Improvement" is $11.00 postpaid in the U.S. and $11.50 postpaid to all other countries.

The editor is well aware that the completion of "Oats and Oat Improvement" was a sizeable undertaking for those involved in its preparation and that the book is not perfect in all respects, what book is. At this time, however, he wishes to express his appreciation to the members of the Monograph Committee of the American Society of Agronomy for sponsoring the preparation and publication of the book, to the editors of the society for their assistance and helpful guidance throughout the undertaking, to all who assisted him in the editing or by reviewing chapters, and to each of the authors for his perseverence in completing his assignment. He hopes each author will derive some satisfaction, from an arduous task eventually completed, and that the book will prove useful to all who are interested in oats.

Franklin A. Coffman
Editor of the Oat Monograph

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*** Report of the Special Committee to Consider Oat Newsletter Distribution Policy ***

The Committee, taking note of the rapid increase in the size of the Newsletter mailing list and wishing to provide the Editor with policy guide-lines, endorses the policy statement adopted by the Executive Committee in February, 1955* and submits these further statements on policy:

1. The Newsletter is a personal informal communication among colleagues. Distribution above the personal level, as to libraries or institutions, should be discouraged and minimized.

2. Individuals receiving the Newsletter should have a tangible, working association with oat improvement. In general, recipients of the Newsletter should be persons who, through their support or direct participation in research, make a contribution to oat improvement. The Newsletter is only peripherally concerned with aspects of oat improvement such as, for example, extension, routine testing, regulatory, commercial or publicity relationships.

3. World-wide participation of oat researchers is desired and should be encouraged.

The Committee makes the following recommendations:

1. The Editor shall include on the sheet for the annual call for material a tear slip which must be returned in order for that individual to receive the latest Newsletter. This slip, in addition to name and address, shall provide space for title, position and other occupational information which will enable the Editor to judge the individual's qualifications to receive the Newsletter.

*See, following this statement.

2. Graduate students engaged in research on oats may receive the Newsletter provided they are sponsored and their names appear on the tear slip of a qualified recipient. Their names will not appear on the mailing list, however, until they qualify through a position in oat research in their own right.

3. The qualifications of new applicants to receive the Newsletter shall be judged on the basis of these policy statements. Applicants may be expected to present reasonable documentation or references regarding their qualifications.

4. The Conference shall establish a 3-man Newsletter Policy Committee consisting of the Newsletter Editor, who shall be Chairman, the Conference Chairman and the Conference Secretary. The Editor may call upon this committee for advice on any matter of policy affecting the Newsletter.

The Committee moves the adoption of the policy statements and recommendations contained in this report.

January 24, 1962

K. J. Frey
J. M. Poehlman
T. M. Starling
N. F. Jensen, Chairman

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Newsletter Policy*

The Oat Newsletter was originally conceived as a medium of communication among research workers on oats with distribution restricted to Federal and State workers and their counterparts in Canada. Emphasis has been on the fundamental phases of oat research and the successive stages which lead to the development and introduction of new oat varieties. Generous cooperation and the free exchange of ideas and plant materials has been one of the most important objectives and achievements of the Newsletter to date. Continued existence of this favorable situation is believed possible only so long as contributors have confidence that their frank discussions are used in the spirit intended. Particularly is this true in the consideration of possible new variety releases. Usually it is the case that such discussion is of a very tentative nature -- possibly two to three years ahead of a firm decision -- and advance public publicity could create special problems for an Experiment Station.

The Executive Committee of the Oat Conference has become concerned with the increasing number of requests for "information copies" from sources whose activities are beyond the scope intended for the Newsletter. The Committee wishes to reiterate that the Newsletter is not a publication in the ordinary sense of the word, and urges that its distribution be governed by the above statement of policy. The Committee recognizes that some commercial companies have research activities which legitimately would entitle them to the Newsletter and will give consideration to such cases.

*By action of the Executive Committee, February, 1955.

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II. THE 1962 NATIONAL OAT CONFERENCE AT GAINESVILLE

*** Program for National Oat Conference ***
University of Florida - McCarty Hall
January 23-25, 1962

Tuesday Evening, January 23, 8 P.M.

Auditorium, McCarty Hall - Southern Small Grain Technical Committee (S-13)
Room 2, McCarty Hall - North Central Technical Committee (NCR-15)

Wednesday Morning, January 24, 8 A.M., Auditorium, McCarty Hall

Presiding - W. H. Chapman

8:00	Registration, Parking Permits, etc.
8:30	Welcome - Dr. J. Wayne Reitz, President, University of Florida
8:45	Business Meeting - Introduction (New Officers)
8:55	Report of Secretary - F. A. Coffman, ARS, Beltsville
9:00	Distribution of Oat Newsletter, Neal F. Jensen, Cornell University
9:15	Uniform Oat Nurseries - H. C. Murphy, ARS, Beltsville
9:30	Report of Committee on Genetic Nomenclature in Oats - M. D. Simons, Iowa State University and ARS.
9:50	DISCUSSION
10:00	RECESS
10:15	World Oat Collection (purpose, maintenance, purification, summarization and distribution of data) - J. C. Craddock, ARS, Beltsville
10:25	Distribution of seed of experimental entries from World Collection - H. C. Murphy, ARS, Beltsville
10:30	Policies and facilities pertaining to the new National Seed Storage Center at Ft. Collins, Colorado - L. A. Tatum, ARS, Beltsville
10:40	Current status of crown rust race situation and possible sources of resistance - M. D. Simons, Iowa State University and ARS
10:50	Prevalence and distribution of stem rust races in 1961 and possible sources of resistance - B. J. Roberts, Univ. of Minnesota and ARS
11:05	Purpose and function of Puerto Rico Oat Rust Nurseries - D. V. McVey, Federal Experiment Station, Mayaguez, P. R.
11:15	Restriction of use by breeders of virulent races of rust already present - H. C. Murphy, ARS, Beltsville
11:25	Oat Improvement in the Andean Zone of Colombia - Charles F. Krull, Rockefeller Foundation, Bogota, Colombia, S. A.
11:45	DISCUSSION AND ANNOUNCEMENTS

Wednesday Afternoon, January 24, 1:30 P.M., Auditorium, McCarty Hall

Presiding - D. T. Sechler

1:30	New frontiers in oat breeding - C. A. Suneson, Univ. of California
1:45	A world germplasm bank for oats - N. F. Jensen, Cornell University
2:00	Early generations of multiple crosses of oats - H. L. Shands, University of Wisconsin
2:10	The buffering effect against disease loss of blends in oat varieties - J. A. Browning, Iowa State University

2:30 The present status of multi-line variety development - K. J. Frey, Iowa State University

2:45 Relationship of new sources of resistance and race identification to multi-line varieties - M. D. Simons, Iowa State University and ARS

2:55 A collection of oat species - F. J. Zillinsky, Dept. of Agr. Research Branch, Genetics and Plant Breeding Institute, Ottawa, Canada

3:05 DISCUSSION

3:15 RECESS

3:30 Breeding behavior of synthetic Avena hexaploids and of certain interspecific Avena hybrids - R. A. Forsberg, University of Wisconsin

3:45 First generation amphiploids of crosses between two tetraploids and common oats - H. L. Shands, University of Wisconsin

3:55 Winter oats - F. A. Coffman, ARS, Beltsville

4:10 The effect of foreign endosperm on the development of the oat embryo - Paul Rothman, Delta Experiment Station

4:20 Effect of wetting and shading bags on seed set of oat crosses - H. G. Marshall, Pennsylvania State University

4:30 A selection index - J. E. Grafius, Michigan State University

4:45 DISCUSSION

5:00 ADJOURN

Wednesday Evening, January 24, 7 P.M., Student Service Center

7:00 Banquet, speaker, Mr. Phil Clayborne, Saturn Project, Cape Canaveral

Thursday Morning, January 25, 8:30 A.M., Auditorium, McCarty Hall

Presiding - T. T. Hebert

8:30 The measurement of relative crown rust damage in different oat varieties - M. D. Simons, Iowa State University and ARS

8:45 The segregation of rust reaction in crosses between autotetraploid varieties of oats - Peter Dyck, Dept. of Agr. Research Branch, Genetics and Plant Breeding Research Institute, Ottawa, Canada

8:55 Physiology of rust resistance in oats and wheat - Maurice C. Futrell, Texas A. and M.

9:10 Cooperative pathology work between Texas and Mexico - Lucas Reyes, Texas Substation, Beeville

9:25 A method of inoculating individual oat plants with a number of races of rust simultaneously - B. J. Roberts, Univ. of Minnesota and ARS

9:35 Observations of Septoria and H. avenae in Eastern Canada - R. V. Clark, Dept. of Agr. Research Branch, Genetics and Plant Breeding Research Institute, Ottawa, Canada

9:45 DISCUSSION

10:00 RECESS

10:15 Pathogenicity of Helminthosporium isolates from oats in Puerto Rico - D. V. McVey, Federal Experiment Station, Mayagüez, P. R.

10:25 Field and greenhouse inoculations of barley yellow dwarf virus - Harvey Smith, New Zealand, Post Doctorate National Research Fellowship with Virology Section of Canadian Dept. of Agriculture

10:35 Variations among vectors and strains of barley yellow dwarf virus - W. F. Rochow, Cornell University

10:50 Problems and progress in testing spring and winter small grains for tolerance to the barley yellow dwarf virus in oats - H. Jedlinski, University of Illinois

11:05 Heritability of resistance to barley yellow dwarf virus in oats - George E. Brown and J. M. Poehlman, University of Missouri

11:20 Inheritance of tolerance to barley yellow dwarf virus in oats - C. M. Brown, University of Illinois

11:35 The new virology - nematology laboratory at Cornell - W. F. Rochow, Cornell University

11:45 DISCUSSION

12:00 ADJOURN

Thursday Afternoon, January 24, 1:30 P.M., Auditorium, McCarty Hall

Presiding - J. A. Browning

1:30 Use of systemic insecticides for control of barley yellow dwarf virus infection at Urbana, Illinois - H. Jedlinski, University of Illinois

1:45 Studies on the soil-borne oat mosaic virus - Robert Tolar, Ga. Coastal Plains Experiment Station and ARS

2:00 The effect of soil-borne mosaic on the yield of oat varieties and selections with varying levels of resistance - W. P. Byrd and G. C. Kingsland, Clemson College

2:10 Preliminary results of the crosses involving greenbug resistance - J. H. Gardenhire, Texas Agr. Exp. Station, Denton, Texas

2:20 Inherent differential pathogenicity in oat smut races as related to determination of smut resistance in oat varieties - C. S. Holton, Washington State University and ARS

2:40 New seed treatments for oat smuts - Earl D. Hansing, Kansas State Univ.

2:50 An inexpensive growth chamber - Paul E. Pawlisch, Texas A. & M.

3:00 DISCUSSION

3:15 RECESS

3:30 Effect of victorin on the krebs cycle acids of oat varieties expressing variable reactions to Helminthosporium victoriae - H. H. Luke, Florida Agr. Exp. Station and ARS

3:45 The occurrence of snow mold on winter oats in Pennsylvania - H. G. Marshall, Pennsylvania State University

3:55 The effect of seed source on the cold resistance of winter oats - E. J. Kinbacher, Cornell University

4:10 Influence of seeding methods on small grain yields and alfalfa establishment - D. C. Hess, H. L. Shands, Z. M. Arawinko, University of Wisconsin

4:25 Spring oat silage preceding soybeans - D. A. Ray, Ohio State University

4:40 Inheritance of compatibility and fertility on crosses of A. sativa possessed by a selection of an autotetraploid of A. strigosa from Japan. F. J. Zillinsky, Dept. of Agr. Research Branch, Genetics and Plant Breeding Institute, Ottawa, Canada

4:50 DISCUSSION

5:00 ADJOURN

Thursday evening and Friday morning left open for continuance of S-13 and NCR-15 meetings if necessary. Otherwise time can be used at discretion of those attending in form of viewing facilities or visiting with personnel.

*** <u>Conference Banquet</u> ***

by W. H. Chapman

The Conference banquet was held at the Student Service Center at the University campus; 7:30 to 9:30 P.M. with W. H. Chapman, Chairman, presiding. The invocation was given by Dr. G. K. Middleton of North Carolina. Guests included Dr. John W. Sites, Associate Director Florida Agricultural Experiment Stations; Dr. H. H. Wilkowski, Assistant Director Florida Agricultural Experiment Stations. Dr. K. S. Quisenberry, formerly Administrator Assistant ARS; Dr. E. L. Grinter, Dean of Graduate School, University of Florida; Mrs. D. E. Western, Mrs. J. M. Poehlman, Mrs. D. A. Ray, Mrs. R. I. H. McKenzie, and Mrs. Phil Clayborne of Cape Canaveral, Florida. Dr. John Grafius of Michigan State University was presented as the new Chairman.

In appreciation for over 40 years of devoted service and numerous contributions to oat breeding throughout the world, Dr. Quisenberry presented F. A. Coffman with a bound volume of letters from many friends throughout the United States and Canada. A similar volume of letters was presented Dr. G. K. Middleton of North Carolina by W. H. Chapman, representing the Southern Small Grains Committee. Volumes of letters were also assembled for Mr. N. I. Hancock of Tennessee and Dr. O. T. Bonnet of Illinois. Since these gentlemen did not attend the Conference, the letters were mailed to them.

Dean Grinter was presented to the group and he introduced Mr. Phil Clayborne who is connected with the Saturn Project at Cape Canaveral. Mr. Clayborne gave a very interesting illustrated talk pertaining to the development of the Saturn rocket. The talk was followed by a film showing the firing of the Saturn. The program was extremely interesting and spectacular and was enthusiastically received by the group.

*** <u>Minutes of National Oat Conference</u> ***
McCarty Hall, University of Florida
Gainesville, Fla.
January 24 and 25, 1962

The first session of the Conference was called to order at 8:30 A.M., January 24, by the Conference Chairman, W. H. Chapman.

About 80 were in attendance and 23 states were represented. This was almost as many states as were represented at the National Oat Conference held at Lafayette, Ind., in January 1958. In addition to oat workers from State Experiment Stations and the U. S. Department of Agriculture, representatives were also present from the Quaker Oats Company, Chicago, Ill.; the Coker's Pedigreed Seed Co., Hartsville, S.C.; from provinces of Canada; and from Colombia, Mexico, New Zealand, and Puerto Rico.

The Chairman first introduced to the Conference Dr. J. Wayne Reitz, President of the University of Florida, who welcomed the Conference to Florida and briefly outlined the present status of and future prospects for educational facilities and experimental work in Florida, especially on the University of Florida campus.

Following the address, the Chairman successively introduced Dr. J. W. Sites, Associate Director, and Dr. H. H. Wilkowske, Assistant Director of the Florida Agricultural Experiment Station; Dr. F. H. Hull, Head of the Agronomy Department; and Dr. A. T. Wallace, Geneticist in charge of the Plant Science Section of the University of Florida. Several of these officials expressed their pleasure that the Conference was being held in Gainesville.

The Chairman then asked each of those attending to stand, one by one and state his name and indicate the institution he represented. He also invited all those present to register at the desk at the entrance to the auditorium in McCarty Hall.

The Secretary of the National Oat Conference was then called on for the report and minutes of the last Conference [January 29-31, 1958, Lafayette, Ind.]. The Secretary indicated that these appeared in Oat Newsletter, Vol. VIII, pp. 1-8. No comments, revisions, or corrections were made and on move by the Secretary seconded from the floor, the minutes were accepted as previously published.

The Chairman next called on Neal F. Jensen, Editor of the Oat Newsletter, for a report. Jensen reported that 350 copies of Volume XI had been printed. He mentioned the deadline, February 1, for receiving material for the next issue, Volume XII, and pointed out difficulties with and asked for assistance in keeping the mailing list up to date. He moved that a "tear sheet" be prepared and sent out to be used in compiling and keeping up to date the list of those who were to receive the Newsletter. Several seconded the motion and it was passed unanimously.

H. C. Murphy then was called on to report on the present status of the uniform oat nursery program piloted by the personnel of the Oat Project of the U. S. Department of Agriculture. Murphy revealed that in 1961 a total of 15 different uniform nurseries were included and that this program involved more than 100 stations in more than 40 states and 4 foreign countries. He mentioned the needs for and suggested the possibility of certain changes being made in the present setup of these numerous nurseries and that a prospect existed of combining some and eliminatin other nurseries.

M. D. Simons, Chairman, presented the report of the Genetic Nomenclature Committee. He suggested that rules be adopted for designating different genes, thus standardizing symbols for the genes. Some discussion followed. Comments were made by K. J. Frey. J. M. Poehlman asked a question as to the procedure. Simons replied by referring to Oat Newsletter, Vol. X, pp. 2-8. E. G. Heyne explained the system now in use in wheat and recommended that a committee be appointed to serve as a "clearing house" for assigning symbols. Jensen pointed out the difficulty of obtaining a uniform system unless a committee is appointed.

Further comments were made by Frank Petr, Coit Suneson, John Grafius, and E. G. Heyne. It was then moved by J. A. Browning and seconded by John Grafius that the report be accepted. This was voted on and passed.

F. J. Zillinsky then suggested that someone should be specifically selected to have charge of this work. After some comments, K. J. Frey moved that the next chairman of the National Oat Conference Committee he instructed to appoint a committee to bring the genetic nomenclature on oats up to date. That motion was seconded by J. M. Poehlman and, following comments by Curt Roane and A. L. Wallace, it was passed unanimously.

The Chairman announced a recess and coffee break of 15 minutes, stating that coffee would be served by the University of Florida; which brought an appreciative response from those attending the Conference.

After the recess, J. C. Craddock reported the World Oat Collection, maintained by the U. S. Department of Agriculture, now includes some 6,800 entries. He mentioned and defined "open stocks" for general distribution and "closed or limited stocks". He indicated there were some 4,500 entries in the "active" or "open stocks" and 200 in the species collection. Panicle specimens of the entire collection are maintained but are not distributed. He stated that in the past, the collection has been grown every 5 years but expressed the hope that with a larger seed supply grown in 1960 and with increased storage facilities the growing of the collection every 10th year would suffice. At present, complete collections are stored at Ft. Collins, Ames, Aberdeen, and Beltsville.

He indicated that those to whom are sent sizable segments of the collection for growing and testing are expected in all cases to send to Beltsville a copy of whatever data they obtain. A complete set of all such data on entries in the World Oat Collection is being maintained and placed on I.B.M. cards for future reference. He indicated that when portions of the collections are sent out, only those entries are included that would appear to have some prospect of proving adapted and should the first set sent fail to give that desired, the entire collection can be sent. He announced that a system of abbreviated names of varieties and selections was being prepared.

K. J. Frey suggested that a committee be appointed to prepare a list of these abbreviations and urged they be published in the Agronomy Journal. H. C. Murphy suggested that the breeders might be contacted as to their preference in abbreviations for their own productions. E. G. Heyne suggested that rules be followed in selecting abbreviations. Craddock explained how some of the abbreviations are chosen.

Murphy then discussed the policy of the distribution of entries in and the availability of the World Collection. Seed of new entries, especially from foreign sources, is grown under the supervision of Craddock. When seed supplies have become sufficient, the seed is then made available to oat men desiring to grow the new introductions in the hope of finding either oats adapted in their particular areas or genes useful in their breeding programs.

F. J. Zillinsky asked Craddock about the availability of the "open stocks", which Craddock explained. Heyne asked if entries in the International Nursery are "open stocks." Craddock replied most of them were.

L. A. Tatum next described the facilities for seed storage at the quarters recently provided at Ft. Collins, Colorado. Space for 300,000 samples is available. He urged those present to send reserve specimens of their material to Ft. Collins which thus should eventually become a storage bank of the older breeding material. He indicated that as now constituted, the laboratory is not authorized to store material received directly from foreign sources but such can be routed through the Cereal Crops Research Branch at Beltsville, Foreign countries should send to Beltsville any material they wish stored. Tatum stated that a contributor of seed stocks can, on sending, restrict his seeds distribution for a 5-year period and that the donor is responsible for the accuracy of the label on the seed. Further, he pointed out that the storage facilities available should keep seed viable for years.

M. D. Simons reported briefly the status of the crown rust situation and stated that several new sources of resistance in oats have recently become available. These included certain oats from I. Wall, of Israel, and a tetraploid form from South America. He indicated that the latter was shown by its progeny to be heterozygous in reaction for resistance to crown rust race 264.

B. J. Roberts reported that stem rust race 6A was prevalent in Minnesota in 1961 and that 75 isolates of Race 6 were obtained on the Canadian oat R.L. 524.1. Collections including race 7A were received from 9 states and whereas 2 isolates of 7A were avirulent on R.L. 524.1, all others attacked that oat. He pointed out that no oat now exists that is not susceptible to some race or races of stem rust.

C. W. Roane asked Roberts what temperatures were used in identifying races of stem rust and Roberts indicated that different temperatures were used stating also that rechecking at different temperatures should and must yet be done in some cases. It was reported that in Canada a rapid increase in races 6A, 13A, etc., has occurred in the eastern provinces.

D. V. McVey traced the history of cereal disease nurseries in Puerto Rico, named the points at which nurseries are grown, and described the differences in climate on the island, the advantages of these nurseries, and problems involved.

No rust is present naturally in Puerto Rico. The first nursery was grown in 1956 and the first large oat nursery, 4,800 entries, in 1957. It was inoculated with crown rust race 264. Points at which oat rust testing is done are Ponce, Isabela, Lajas, and Mayaguez. Differences in climate exist since at Mayaguez annual precipitation is 80 inches, whereas at Lajas, 30 miles away, it is 36 inches. The different areas are isolated by ranges of hills and prevailing winds are from east to west. There are no alternate hosts for rust in Puerto Rico and natural grasses do not become infected by rust. Checks made indicate that 3 weeks after an oat rust nursery is destroyed, inoculum apparently has disappeared. The primary problems are nursery infestations by nut grass"cokee" and by worms. Grass requires hand work for its control and worms are kept in check by use of sprays. Data on adult plant reactions are obtainable, which help to speed up oat-breeding projects in North America.

Murphy pointed out the need to obtain a permit to send rusted material through the mails. He reported that hesitation exists because of the hazards from the introduction of dangerous races into this country or into areas where not present but in which scientists wish to test them. He proposed that a committee be appointed including representatives of the (1) Canadian Department of Agriculture, (2) Minnesota Agricultural Experiment Station, (3) U.S.D.A., both control and identifying agencies, and (4) the Department of Agriculture of Mexico.

C. J. Krull, of Bogota, described the situation with oats in that country. Biotypes of stem rust not yet found in the United States are present (6c). Biotypes present attack all oats including Saia so apparently no adequate source of resistance to the present stem rust complex is available. In one culture of oats he found 2 plants that had seedling resistance to be susceptible in the adult stage. He suggests that possibly new races appear on grasses. Attempts to identify the races present are being made and efforts are also being made to keep dangerous races from reaching the United States on the clothing of visitors who return from Bogota.

During the discussion period following the paper by Krull, Tatum indicated that efforts are being made to obtain seed of different cereals by growing the collections to keep supplies available. P. E. Pawlisch asked if restricted C.I. collections will be made available to commercial interests. Murphy replied that such would be obtainable after 5 years unless the restriction of the donor was extended. Heyne commented on the desirability of entries in the collection being made available. Byrd then asked about the methods used in obtaining rust collections. Simons indicated any unusual outbreak of rust is of interest and collections should be made and sent in. Roberts commented on the difficulties of identifying stem rust races and appealed to oat breeders and pathologists to send in spores of any race they find.

Dr. Iguacio Narvez, from Mexico, asked if it would be permissable for those in Mexico to name and release any selection in the uniform rust nursery that appeared to be promising as a variety in that country. Murphy stated that all entries in these nurseries have C.I. numbers and any cooperator should, prior to naming a strain in Mexico, check with the U.S.D.A. to see if the strain in question is already named or if the producing agency contemplates naming it.

Smith questioned if the danger of new rust races justified all the precautions being used. Krull in response pointed out the danger from such races as the stem rust race present in Bogota. Roberts also pointed out the danger of distributing especially virulent races and stated the reasons Minnesota rejects requests for inoculum of such.

Morning session adjourned at 12:05 P.M.

Afternoon Session, January 24

The conference was called to order at 1:30 P.M. by Dale Sechler, presiding.

Coit Suneson described improved oat varieties recently released in California as well as varieties grown in the past. He discussed present breeding methods used, pointing out the special climatological conditions existing in California which especially limit the type of oats adapted in that state. He stressed the fact that few oats from other areas are adapted in California and California oats are limited in adaptation elsewhere.

Neal F. Jensen explained the method he proposed for collecting a composite of F_2 seed from F_1 plants. He mentioned the large number of crosses made and the small number ever adequately studied, mentioning the losses resulting from such a practice. He asked breeders to contribute to the composite he is developing at Cornell and stated the plan for assembling this composite will be published in the Oat Newsletter.

H. L. Shands described his procedure for producing multiline varieties, which presumably will also be published in Oat Newsletter and need not be discussed here.

J. A. Browning described the situation with oats in the past 2 decades - an era of "boom and bust" resulting from a period of the successive releases of new "pure line" varieties, only to have each in turn succumb to a new disease or a new race of an old disease. He suggested that by mixing seed from a number of morphologically similar lines differing in disease resistance, at least the portion of the mixture susceptible to any new race would be reduced and over the long period the mean yields would be higher. He advocated the use of "blends" as a means of stabilizing oat production.

K. J. Frey outlined progress being made at Ames in producing multiline varieties or "blends." Starting with Cherokee and Clintland, progress is resulting through a program of backcrossing in which oats from different sources are being used to obtain different genes. He stated that much backcrossing already has been done in the North Central states and eventually multiline varieties differing in different states likely will result from this method of breeding. He suggested that such a program conducted in the South might reduce the spread of new and virulent rust races. He suggested also that each component be considered separately and that populations could eventually result that would be "pure lines" for some but not necessarily all genes.

M. D. Simons discussed very briefly some sources of genes for resistance that should be considered in multiline breeding and also pointed out some of the problems involved in eventually attaining those objectives sought.

Frank Zillinsky announced that a collection of species had been assembled from 12 different sources. He indicated the desirability of cytologically studying the chromosomes of these oats for the eventual purpose of their identification. He indicated that duplication may be great and that difficulty exists in obtaining anything different and new. He mentioned the problem of dormancy and also that of mixed seed lots which could be misleading. He cautioned that critical examination of material is necessary. He stated that primitive species are limited primarily to the Mediterranean area and pointed out the desirability that a survey in that region be made to collect such oats as may be found there. He indicated that no seed of Avena longiglumis is now available in North America. He suggested the desirability of obtaining by study of the chromosomes evidence as to speciation in oats.

In the discussion period, C. F. Murphy asked Jensen for specific information as to the status of his composite, to which Jensen replied some progress had already been made in assembling the composite. Thurman observed the difficulties in obtaining sufficient seed from F_1 plants in Arkansas for having excess seed for contributing to such a project. H. H. Luke indicated to Roberts, citing Stakman and Christensen, that alternate rust hosts are not present in the South, hence the South should not be reproached for being a source of new rust races. Luke also raised the question as to why multiline varieties can not eventually prove effective in the production of new rust races. Browning indicated crown rust race 216 really "exploded" in the North and admitted that conceivably multiline varieties could prove a source of new races, pointing out the need for data to indicate that such was the case. Luke pointed out that conditions are far different in the South than in the North as up to 8 cycles of rust often occur in the South which would render ineffectual any procedure that relied primarily on a "slow build up" as a protective measure.

Recess and coffee break.

R. A. Forsberg mentioned results from studies of chromosome numbers in root tips of synthetic Avena hexaploids. No differences in chromosomes apparently existed between rust-resistant and -susceptible oat lines. He described efforts to use amphiploids in crossing with A. sativa and indicated that such crosses give the best promise for transferring resistance to rust from minor species to the hexaploids.

H. L. Shands pointed out the difficulty in transferring to hexaploid genes found in tetraploids stating it was more difficult than had been indicated. He reported that by use of colchocine E. A. Sears had made such species crossing feasible. Shands indicated that he has obtained, from use of this technique, a number of hybrid seed. He showed the differences in size of plants and of seed of the material crossed, as well as of progeny produced from such crossing.

F. A. Coffman indicated the areas of culture of winter and, consequently, of spring oats 50 years ago; the locations at the start of uniform yield and hardiness nurseries in 1924 and 1926, respectively, and points at which such nurseries are grown to date in the United States. He indicated also the winter temperature zones, thus the areas of adaptation of the different types of winter oats, the area in which each of the 3 uniform fall-sown oat nurseries is now grown, and the expanded winter oat area as it is today.

Progress made in 35 years in breeding more hardy oats was shown graphically, which reveals rather steady progress and the fact that oats now exist that are over 40 percent more hardy than Winter Turf, the leading variety of 50 years ago.

He showed the hazardous area for oats in the United States where only the most hardy winter varieties and spring sown red oat varieties are best adapted, indicating that in this area spring weather is so capricious that spring sown oats too must have some degree of cold resistance which results also in some degree of heat resistance. Advances in hardiness and in straw strength now available for use in winter oat improvement were indicated. He noted recent observations as to seedling pubescence of our most hardy varieties, apparently another easily-observed character for use in identifying real sources of hardiness for use in oat breeding.

P. G. Rothman presented results obtained from transferring embryos in oats with the possibility that such a technique might prove useful in obtaining additional seed yields in F_1 hybrid material. No effects from this technique resulted so far as rust resistance was concerned. No effects resulted on plants from excised endosperm transferred to corn. Plants of Delair resulting from excised endosperms of Delair showed no difference in plant characters from plants of Delair produced normally.

H. G. Marshall explained techniques used for increasing seed set in oat crossing. He observed that wetting the protective glassline bags after pollination resulted in increased seed set among florets hand-pollinated and that shading the panicles for an hour after pollination resulted in a still further increase. These techniques used over a period of 3 years had resulted in increased success in crossing as evidence by the fact that 2027 crosses had been effected in 3 years.

John Grafius explained his system of rating indexes as a means of predicting what one can expect from the progeny of a given oat cross. His system is explained elsewhere in this Oat Newsletter.

The Conference was adjourned at 5:00 P.M. by Dr. Sechler, who thanked those appearing on the program for keeping to the schedule.

The Conference banquet was held at the Student Service Center on the University campus; 7:30 to 9:30 P.M., W. H. Chapman, chairman, presiding.

Thursday Morning, January 25

The Conference was called to order at 8:30 A.M. by T. T. Hebert, presiding.

M. D. Simons indicated the extent of damage resulting from infection by crown rust and presented data obtained on the influence of rust on yields. He discussed the use of sprays for controlling its spread. His results indicated the effectiveness of spraying and revealed considerable information as to the economic promise of spraying.

Peter Dyck presented results obtained from genetic studies on the inheritance of resistance to crown rust races 264 and 294 in crosses of resistant-susceptible oats. He pointed out the difficulties in transferring crown rust resistance from the diploid to the hexaploid. He cautioned against discarding progeny too hastily as not all favorable factors are quickly manifest or identifiable in progeny of species crossed. In a cross of C.D. 3820 x susceptible oats, the progeny segregation appeared to be simple or in a 3:1 ration, whereas in a cross of which C.D. 4718 was the resistant parent, 2 genes for resistance were indicated. He mentioned that C.D. 1052 and C.D. 1062 had also been used as parents in crosses with cultivated oats.

M. C. Futrell presented results obtained from the use of different sprays to control rust on oats. He stated that the oat plant is more susceptible to damage from sprays containing nickel than is wheat. He also pointed out that sprays used for the control of rust result in better protection when used on some varieties than when used on others, probably indicating some varietal specificity.

Lucas Reyes pointed out that the dangers existing from disease increase in warmer areas over those in cooler regions. He mentioned the need for more cooperative efforts between southern United States and Mexico. Such cooperation was started in 1955, and he indicated that cooperation would be especially valuable in rust testing. He pointed out that one million acres of oats are grown annually for pasture purposes only, in southern Texas and that Texas ranchers are fully cognizant of the value of rust resistance.

He pointed out that Palestine, lacking rust resistance, was the poorest oat grown at Monterrey, whereas 100 miles away, where rust was not present, it yielded best.

He mentioned the use of varietal mixtures in oats for pasture purposes and stated that they are promising and that a mixture of seed of 60 percent winter and 40 percent spring oat varieties proved a valuable pasture mixture.

B. J. Roberts explained the unique technique for rust inoculating oat plants devised by M. B. Moore, of Minnesota. The technique consists of the use of an ingenuous special clamp-like apparatus which is fastened on the leaf of the oat seedling, following the placing of rust spores on the clamp. By use of this clamp, in cases where 1 or more races are involved, up to 6 inoculations can be made on a single leaf simultaneously. He pointed out special precautions made to avoid errors and stated that up to 1,000 inoculations can be made from "loading"; and although preparations necessary previous to making the inoculations take longer, in the end, time is saved. He recommended the use of this device in conducting genetic studies where resistance to several rust races are to be studied.

R. V. Clark discussed results obtained from studies of _Helminthosporium avenae_ in Canada. He stated that in species crosses, resistance to _H. avenae_ usually is lost or is "covered up" in the progeny produced. He described methods employed to determine the amount of loss from diseases, indicating that the use of sprays has controlled Septoria and has resulted in up to 75 percent increases in yield. He reported studies of the reaction of Septoria on oats grown following different applications of nitrogen. Mercury was the key element useful in the control of Septoria.

In the discussion period, W. P. Byrd asked for an explanation of variance as used by Simons in his discussion. This was explained by Simons. Pawlisch asked to what races of rust were the tetraploids used by Zillinsky resistant. Zillinsky reported they were resistant to about all races. Luke questioned Futrell as to role of absorbic acid in his studies. Pawlisch asked Roberts regarding time in the chamber necessary to obtain adequate rust infections when the device of Moore was employed.

Recess and coffee break.

D. V. McVey explained the occurrence of dead plants in oats in Puerto Rico and attributed them primarily as due to *Helminthosporium victoriae* which he stated is much more pathogenic under conditions found in Puerto Rico than it is in the United States. He pointed out that Wilson had found numerous oat varieties that were present in the United States long before the introduction of Victoria, C.I. 2401, that were susceptible to this organism. He stated that tests made in Puerto Rico had given results that were similar to those observed by Wilson, also that Simon's culture of *H. victoriae* was less pathogenetic than the Puerto Rico culture but, in general, about the same reactions were obtained from both.

Harvey Smith indicated that 4 trials were made for determining the reaction of BYDV of oats received from Zillinsky, several from oats received from Henry Jedlinski, as well as of a barley received from Suneson. He stated that lines received from Zillinsky all proved susceptible and had apparently lost resistance in the breeding process.

Reactions of oats received from Illinois and barley from California corresponded in general to results found in those states. Also reactions obtained in Illinois and in New Zealand correspond. In New Zealand, Avon is apparently most resistant to BYDV in the adult stage. He announced that soil-borne mosaic is present in Australia and that 4 types of oats according to their reaction to BYDV existed, represented by (1) Saia, (2) Albion, (3) Fulghum, and (4) California Red, Garry, and Clinton [highly susceptible].

He indicated adequate light intensity, cool temperature, high soil fertility, and adequate inoculum was necessary to obtain infection by BYDV and that on somewhat resistant oats the number of aphids is important to obtain infection, the yields being decreased proportionally to infection.

The appearances of W. R. Rochow and H. L. Shands on the program were reversed. Shands described the results obtained from depth and method of seeding experiments on resulting stands of small grains, especially oats, sown with alfalfa. The drill was so adjusted as to permit seeding at different depths as desired. As the specific results of these experiments are expected to appear elsewhere, they are omitted here.

Jedlinski indicated that at present a degree of tolerance to BYDV is the best protection available in oats. He recognizes 4 types; immunity, hypertensity, tolerance, and susceptibility. At Illinois, one type of vector and one strain of virus are used. From 5 to 10 vectors are allowed to feed for 3 days, after which systemic and contact sprays are used to control the vector. He indicated that work with one organism at a time is necessary and that testing more than one strain of the vector at one time may give results differing from what might be expected.

J. M. Poehlman discussed results from studies of the inheritance of BYDV. He stated that 5-10 aphids were placed on each plant space-planted at intervals of 1 x 1 foot. Results were determined by visual observation of damage done. All plants exhibited damage. In the crosses Tonka x C.I. 7448 and Tonka x Rodney, heritability was shown. He indicated that selection for tolerance for BYDV resistance in F_2 would appear feasible. He indicated that a more exact method for estimating damage than that of visual observation would appear desirable and expressed the belief that possibly grain yield per plant attacked might prove a reliable means of selecting for BYDV resistance.

C. M. Brown presented results of studies of the inheritance of BYDV at Illinois. He stated that Albion seemed to offer the best resistance among hexaploid oats. Segregation in progeny of crosses of Albion x Clintland and Albion x Minhafer was studied. In the latter cross, resistance to BYDV appeared to be dominant and Albion appeared to have a single dominant gene, judged by the F_2 segregations. In the Albion x Clintland cross, the F_1 was intermediate; in F_2 segregation, more plants were on the "susceptible side", which indicated that Albion did not interact the same in the 2 crosses. He indicated the belief that apparently Clintland had a gene for susceptibility, whereas Albion had a dominant gene for resistance. He indicated that resistance is, in general, a character that can be transferred easily by backcrossing, regardless of how it appears to be inherited.

W. F. Rochow was not presented at this time and the Conference adjourned about 12:40 for lunch.

Afternoon Session, January 25

The Conference was called to order at 1:35 P.M. by J. A. Browning, presiding.

Henry Jedlinski described results from use of systematic insecticides for the control of BYDV vectors. Several such were employed as controls. He indicated that insecticides can control the vector but they cannot cure the infected plant. He stated that damage has been observed in September among fall-sown cereals. The amount of damage effected is dependent on the number of vectors and climatic factors. There are 9 known vectors but the efficiency of these varies with the species.

Robert Tolar described a technique useful in inoculating plants with soil-borne mosaic. An "artists brush" using 60 pounds per inch, pressure was employed to make inoculations with a solution, of which leaf tissue from mosaic-infected plants was one component. Results indicated that no specie or variety of oats is immune but that differences in tolerance, especially under field conditions, were observable.

W. P. Byrd stated that no oat has adequate resistance to soil-borne virus for recommending it for growing in a field known to be infected. Soil-borne mosaic will reduce both growth and yield when other diseases are present and vice versa. He reported some South Carolina summary results from the uniform soil-borne mosaic nurseries grown in the South in recent years. He referred to a manuscript by Coffman, Hebert, Gore, and Byrd.

J. H. Gardenhire presented in summary form results obtained from investigations of the damage resulting from greenbugs. He indicated that Saia was the most resistant oat available and that Russian 77 was also resistant. In a cross of New Nortex (susc.) x Russian 77, a ratio of 42:101:56 (susc.) was observed; whereas, in the cross C.I. 7333 x Siberian 1716, a ratio of 40:43:97 (susc.) was observed. He indicated that Siberian 1712 may be heterozygous for resistance to greenbugs and pointed out that when given the chance, these bugs will seek out the susceptible plants in a population.

C. S. Holton outlined the history of and the techniques used for the identification of the different races of smut in oats. He mentioned the key races now used in the preliminary determination of the general type of resistance or susceptibility present in oats. He indicated the reactions to be expected from other races as the result of the use of the different key combinations of smut races. He indicated that with the addition of each new host variety for a specific race, a new virulence gene is added.

E. D. Hansing traced the treatments used to control smut during the past 30 years. He recalled that formalin was once used to control smut and mentioned some of the difficulties attending its use. Ceresan came into general use about 1940, Pantogen in solution about 1950. Since 1950, combinations of mercurial solutions have been employed to control smut in oats.

In 1960, Chipcote and other fungicides were used. The use of the new mercurials is not difficult as compared with older seed treatments. He indicated that at present some 10 percent of the oats grown in this country are smut susceptible and that seed treatment for seed of oats included in international nurseries as well as for those in regional nurseries, would be advisable.

Paul E. Pawlisch, showed plans and specifications for a useful and economical growth chamber for growing experimental oats in warm climates. The cost of this chamber was estimated as $500. Complete information on this chamber is apparently to be published later or can be obtained from Pawlisch.

In the discussion period Holton was asked as to sources of new smut races or collections. He indicated interest in receiving specimens of what might prove likely new races.

Pawlisch was asked about the shading used in his chamber and indicated it was built in the greenhouse, which could be shaded. He was also asked about the type of cooling element employed and its efficiency of operations.

Recess and coffee break.

H. H. Luke indicated that prospects may exist for the control of rust by means other than by breeding, raising the question as to whether breeding, however laudable, was the sole solution to all our cereal rust problems. He pointed out the different chemical changes taking place in the oat plant, stating that these have recently become better understood and suggested that this field might well be given added attention. He proposed that the field of control of many diseases by chemical means could conceivably prove of much interest to breeders and plant scientists within the next 10 years.

H. G. Marshall pointed out that as winter oats are moving northward, new problems and disturbing influences, such as snow mould, are appearing. He discussed results in tests of Norline and Dubois and the effects of snow mould on prospective new oat varieties for more northern areas where snowfall is heavy and snow mould organisms have been found to be present and damaging.

E. J. Kinbacher discussed the influence of seed source on the relative cold resistance and development of young seedlings of the same variety grown at different locations. He indicated that the differences are marked and do not necessarily depend on the chemical composition of the oat seed planted and that the influence of source of seed may extend up to 3 years.

W. F. Rochow appearing at this point of the program instead of H. L. Shands, indicated that the 3 interrelated factors in the BYDV problem are weather, vector, and disease. He pointed out that apparently a latent period occurs in the vector when only a short feeding period is used but that the ability of the vector to transmit the disease increases with the increase in the length of time the vector is on the plant. He stated that the general picture of vector-virus in BYDV needs further study.

D. A. Ray discussed yields of oats as a silage-purpose crop. Among oats, the yields of later maturing varieties exceeds that of earlier sorts. Yields of soybeans following Clintland were higher than those following later maturing oats. Soybeans may be given consideration as a crop to be used after oats for silage. He pointed out that alternate crops to be worked into the rotation with oats for silage are prompting attention.

Zillinsky mentioned the use of an autotetraploid of Avena strigosa received from Japan which had resulted in a surprising increase in compatability and thus increased success from attempts to make crosses between it and A. sativa. He indicated that this new development may have a potent influence and offer much promise in future oat breeding projects.

This paper concluded the presentation of papers for the National Oat Conference at Gainesville, Florida.

At this point W. H. Chapman, chairman, announced that the meeting was open for discussion. After a few remarks and comments had been made from the floor, the Chairman thanked the group for their cooperation in keeping the program so nearly on schedule and stated his appreciation to Dr. Hull for arranging for the bus to transfer to and from the McCarty Hall those staying at points off campus.

He then asked the newly elected Conference Chairman, John Grafius, to come forward and be installed after which he made a few appropriate remarks. The newly installed Chairman recognized H. C. Murphy who suggested that the conference go on record as stating their appreciation to the personnel of the University of Florida and especially to W. H. Chapman for their efforts in behalf of the National Oat Conference which had made it so successful.

K. J. Frey then read the following resolution:

"Be it resolved that all persons attending the 1962 meeting of the National Oat Conference wish to express their appreciation and gratitude to the University of Florida, the city of Gainesville, the great state of Florida, and especially to Mr. Chapman, Mr. Wallace, Mr. Luke, Mr. Sechler, Mr. Pfahler, and other members of the University of Florida staff who spent so much time and effort to make this meeting the howling success that it has been. Their hospitality, their arrangement of facilities, the weather, and their joviality were largely responsible for making this meeting successful. So, fellow oat workers from the University of Florida, we sincerely congratulate you for a job excellently done."

It was moved by Frey that the resolution be adopted and with a chorus of seconds was approved unanimously. The newly installed Chairman announced at 5:30 P.M. that the National Oat Conference was adjourned.

Franklin A. Coffman, Secretary

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*** Abstracts (Some appear in expanded form elsewhere in Newsletter) ***

Current status of crown rust race situation and possible sources of resistance -- M. D. Simons. Races of race group 290, which attack the variety Landhafer, now comprise about one-fourth of all isolates identified. Race 264, which attacks all hexaploid sources of resitance has not increased in prevalence in the past several years. Races recently discovered include race 321, which attacks both Landhafer and Saia, and races 325 and 326, which attack both Landhafer and Victoria, but which apparently are not closely related to race 264. New sources of crown rust resistance of potential practical value include lines of *Avena barbata* and *A. sterilis* from the eastern Mediterranean region.

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*** Function and Purpose of Puerto Rico Oat Nurseries ***

by D. V. McVey

The main objectives of the Puerto Rico oat rust nurseries are to accelerate the breeding program by obtaining plant reactions to specific virulent races of rust in the field during the winter season. These functions can be carried out effectively because: (1) Puerto Rico is isolated and the use of virulent races of rust does not endanger the North American crop, (2) wheat and oats grow well but are not grown commercially in Puerto Rico, (3) rust is not naturally present, (4) the alternate hosts are not present, and (5) climatic conditions are favorable for severe epiphytotics, eliminating the possibility of escapes unless the material is extremely early.

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*** New Frontiers in Oat Breeding ***

by C. A. Suneson

I am a small-time oat breeder with experiences and philosophies developed under unique isolation and administrative insulations in California. The environment component acting on the breeder has had too little attention. The UCD mascot is the mustang!

In the evolution of oats very little has been done by man to make it competitive with other grain crops in arid regions. Hence conventional breeding procedures - introduction, selection, or hybridization - or emphasis on conventional breeding objectives, has not yielded the needed germ plasm for substantial productivity gains (like those achieved in Pawnee and Elmar wheats.) Too long, we overlooked the real gene resource on our doorstep -- *A. fatua*, which is our principal weed.

Three variety releases: Indio (1955), Curt (1958), and Sierra (1961), brought us over 30% yield increases. We also have unprecedented shatter resistance, and new desert, irrigation, and forage potentials from oats.

In my program crossing is now entirely on nulli or monosomics, and exploitation via "evolutionary breeding". The general objectives are greater genetic diversity, better drought resistance or evasion, and higher test weights.

We now grow oats for hay on nearly 1/2 million acres. Why not produce an oat which will rattoon? It might displace another million acres of alfalfa in the water hungry southwest.

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*** Early Generations of Multiple Crosses of Oats ***

by H. L. Shands

A brief history of multiple crosses of oats made at the Wisconsin Experiment Station was presented at the 1960 Agronomy Society meeting in Chicago. The crosses have been grown in the nursery and multiplication plots.

In small nursery populations a balanced series was maintained by harvesting one or two spikelets per plant in a very few rod rows, and planting at thin rates the following year. A competitive series was maintained by planting one or more rod rows at the regular seeding rate of 2 1/2 bushels per acre followed by random choice of seed the following year. Limited selection in other populations have been made on a kernel basis and carried in modified bulk. Further, limited panicle- and plant-selection have been made in still other populations.

Bulk populations thinly planted have been grown in fields beginning with the 2 quadruple and the quintuple crosses starting with F_2 seeds in 1959. F_3 seeds were provided to a limited number of breeders in the United States and Colombia, S. A. It is hoped that seed of non-selected populations will be returned to Wisconsin in 3 or 4 years to see if natural selection influence might vary with location where grown.

Recently plant height has been a basis for grouping bulk populations.

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*** A Proposal for the Control of Cereal Rusts in North America with Synthetic Tolerant or Multiline Varieties ***

by J. Artie Browning

Diseases caused by the rust fungi are the number one hazard in oat production. Attempts at controlling these diseases in the United States with pure line varieties have been only partially successful, since wide-spread use of the same resistance genotype over wide areas has effectively selected for variants in the rust population capable of attacking the pure line variety, and negating its usefulness after only 3 to 7 years.

Experimental data suggest that plantings of blends of different rust resistance genotypes as "multiline varieties" buffer against disease loss. Experimental data show that blends reduce the rate of spread of rust. Susceptible plants in a two-way blend of near-isogenic lines of Clintland (Table 1) had only about 50% to 60% as many uredia as similar plants in pure stands. This was true whether one component was resistant to both races present (Entry Nos. 4 and 6), or whether each component was susceptible to one but resistant to the other race present (Entry No. 5). In a three-way blend (Entry No. 7), with one component resistant to each of two races, and each of the other two components resistant to one race but susceptible to the other, there were only about one third as many uredia on susceptible plants in the blends 12' from the focus as in pure stands. This delay in spread of the rust satisfactorily explains the visibly greater amount of rust on susceptible plants in pure stands than on the same genotypes in blends, and the resultant increase in yield of the blend.

When initial level of inoculum was varied so that the susceptible component in pure stand was reduced in yield 37 per cent at the lower level of inoculum to 77 per cent at the higher level, the blends were affected relatively much less by increasing the amount of inoculum than were the pure stands.

The characteristics of a "multiline variety" of reducing the rate of spread of inoculum and yielding relatively well under heavy as compared to light infection, fit the concept of a conventional tolerant variety, and suggest the term "synthetic tolerant variety" for a multiline variety.

Van der Plank (in Horsfall, J. G., and A. E. Dimond. Plant Pathology. Vol. 3. The diseased population, epidemics and control. 1960. Academic Press, New York) makes the profound suggestion that cereal rusts in North America be controlled by planting only tolerant varieties which should delay the rust epidemic "out of existence". Since pure line tolerant varieties may be tolerant to some races but susceptible to others, widespread plantings of varieties tolerant to prevalent races would be endangered by new variants in the rust population. Theoretically one would expect that multiline varieties would offer little selective advantage for a new rust variant, tending thereby to stabilize the rust population, and therefore, the varietal situation.

It is proposed, therefore, that cereal rusts in North America be controlled with synthetic tolerant or multiline varieties, which should simultaneously allay rust losses and stabilize small grain varieties and, therefore, rust races. This would be a move in the direction of the stabilizing genetic diversity of nature.

Table 1. Mean number of uredia of oat stem rust race 7 and/or 8 on 10 susceptible plants at 8 points of the compass 12 feet from the focus in blends of Clintland A (Resistant to race 7), Clintland BD (Res. to races 7 and 8), and Clintland D (Res. to race 8), expressed in percentage of number of uredia on susceptible varieties in pure stands.

Entry No.	Varieties in Blends (Percentage)			No. of uredia on susceptible plants in % of that on pure:	
	C-A	C-BD	C-D	Clintland A	Clintland D
1	100	-	-	100	95
2	-	100	-	0	0
3	-	-	100	105	100
4	50	50	-	57	54
5	50	-	50	60	57
6	-	50	50	65	62
7	33	33	33	37	35

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*** Present Status of Multiline Variety Development ***

by K. J. Frey

The purpose of this program is to develop two varieties of oats that are multiline for crown rust resistance but homogeneous for other characteristics. This is to be accomplished via backcrossing. The recurrent varieties are C.I. 7555 (Clintland + the A and B genes for stem rust resistance) and C 237-89 (an early experimental strain from Clintland x Garry). The sources of crown rust resistance genes being used in the backcrossing program are as follows:

Variety, C.I. or P.I. No.	No. of genes	Adult or seedling resistance
Saia (Abd. 101)	1	S
C.I. 2923	1	A
Wahl #8 (A. sterilis)	3	S
Wahl #7	1	S
Wahl #2	1	S
Acencao	2	S
Victoria	1	S
Trispernia	1	S
Bond	1	S
C.I. 5105 (Johnson)	1	A
P.I. 174544	1	A
P.I. 174545	1	A
Ch 178	1	A
C.I. 3030	1	A
P.I. 185783	1	A

The backcrossing status of these genes is as follows as of March 1, 1962:

Type of reaction	Generation						
	F_1	Bc_1	Bc_2	Bc_3	Bc_4	Bc_5	Seg
				C649			
Seedling	-	2	4	2	1	-	2
Adult	3	2	1	-	-	-	1
				C237-89			
Seedling	1	8	2	-	-	-	-
Adult	5	-	-	1	-	-	-

A total of 18 crown rust resistance genes are now being backcrossed into the 2 recurrent parents. A cooperative program has been initiated with the Illinois Experiment Station whereby Drs. Brown and Jedlinski will incorporate the Albion BYDV resistance into the recurrent parents.

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*** Relationship of New Sources of Resistance and Race Identification to Multi-line Varieties ***

by M. D. Simons

The principal concern of race identification as related to multi-line varieties is the appearance and prevalence of biotypes of rust that can attack all, or a large percentage, of the lines comprising the variety. "Differentials" should include separate pure lines of each of the component lines of the variety.

Rust should be identified primarily on a biotype basis to obtain information on the pathogenicity of dangerous biotypes that might be obscured if mixtures were identified. New biotypes of rust dangerous to a multi-line variety would be expected to arise less frequently than do biotypes capable of damaging a pure line variety, because existing biotypes would have to undergo more changes in the case of the multi-line variety. New sources of resistance would probably be needed in time, but the problem would not be as pressing as with pure line varieties.

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*** Breeding Behavior of Synthetic Avena Hexaploids and of Certain Interspecific Avena Hybrids ***

R. A. Forsberg and H. L. Shands

Most A_6 through A_9 A. abyssinica x A. strigosa amphiploid root tip cells contained from 38 to 44 chromosomes; chromosome numbers varied among cells in the same root tip. Generally, the self fertility of A_5 through A_7 amphiploid plants was not stabilized at the fertility level of their parent plant. At higher levels of parent-plant fertility, most progenies were less self fertile than their parent plant (exceptions were found). Most A_4 through A_8 lines continued to segregate for crown rust reaction. Amphiploid plants were used as the female parent in successful crosses with 14 different varieties and selections of A. sativa. Amphiploid x A. sativa pollinations made in the greenhouse yielded 212 F_1 kernels. Eighty-eight per cent of planted F_1 kernels produced plants. Under open pollination conditions in field nurseries, 55% of the F_1 plants and 60% of the F_2 plants were completely self sterile. Over 95% of F_1 and F_2 plants yielded less than 10 kernels per plant. In contrast, self fertility of F_3 plants ranged from 0 to 100%. When F_1 or F_2 plants were used as female parents in backcross pollinations with A. sativa, seed set was less than 3%; but when F_3 plants were used as females, seed set rose to 19%. Twenty-two F_2 plants evaluated as possessing the amphiploid-type crown rust resistance had 37 resistant and 28 susceptible F_3 progenies. No highly self fertile, crown rust resistant derivatives were obtained by continuous backcrossing using A. sativa as the pollen parent. In 1960, several amphiploid x A. sativa hybrid derivative plants which possessed the amphiploid-type crown rust resistance were successfully used as pollen parents in further backcrosses to A. sativa. Because of low crown rust infection in the 1961 field nursery, it was felt that the 1961 crown rust resistant reaction of certain F_1 and F_2 plants from these restitution type crosses could not be evaluated as due solely to the amphiploid resistance. The evaluation of F_3 progeny lines will help to clarify the genotype of this material.

Three crown rust resistant Avena tetraploids, C.I.7232, Abd. 100, and A. barbata var. excoimbra, have been crossed with A. sativa. Progenies from early generation backcross derivatives were quite variable in crown rust reaction and in self fertility. Efforts to develop stable, true-breeding hexaploid types which possess crown rust resistance from the tetraploid parent are continuing.

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*** First Generation Amphiploids Between Crosses of Two Tetraploids and Common Oats ***

by H. L. Shands and R. A. Forsberg

Crossed seeds of *A. barbata* var. *excoimbra* no. 20 (2n=28) and C.I. 7232 (2n=28) and common oats (2n=42) were sent to Dr. E. R. Sears who grew the pentaploids and used the colchicine technique to double the chromosomes. His help is gratefully acknowledged. Harvested plants of the decaploid type were classified for spikelet fertility, hull color, plant height, number of tillers per plant and stem rust infection. Average spikelet fertility ranged from 9.0 to 55.0%. The two tetraploids differed markedly in their influence on height of amphiploid plants. Height of plants within populations was moderately uniform.

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*** The Effect of Foreign Endosperm on the Development of the Oat Embryo ***

by Paul G. Rothman

Mature embryos of the oat variety Delair were removed from the dry caryopsis with a razor blade and grafted onto sources of foreign endosperm. These sources included the endosperm (from which the original embryos had been removed) of Victor grain 48-93 oats, Atlas 66 wheat, Gator rye, Harbine barley, and Dixie 55 corn. Check plants included excised embryos without grafted endosperm and unaltered Delair seeds.

Table 1. Averages of first, second, and third transplantings of Delair oat embryos to foreign endosperm. Planted March 4, 1960.

Endosperm source	Trans-planting	Days to emergence	Heading date	Plant height	Number tillers
				inches	
Oats	T^1	5	5-23	37.0	3.9
	T^2	5	5-23	36.5	3.5
	T^3	6	5-25	39.7	4.8
Rye	T^1	5	5-26	36.8	3.5
	T^2	5	5-26	34.3	3.0
	T^3	6	5-30	38.8	3.0
Barley	T^1	5	5-27	37.7	2.3
	T^2	5	5-27	36.5	3.0
	T^3	6	5-28	35.5	3.8
Wheat	T^1	5	5-26	37.8	3.5
	T^2	6	5-26	36.5	3.5
	T^3	5	5-28	36.3	2.9
Corn	T^1	5	6-3	36.9	3.6
	T^2	5	5-28	31.9	3.6
	T^3	6	6-4	35.6	2.7
Excised embryos	-	6	6-1	29.0	2.9
Delair (ck)	-	6	5-21	36.3	3.7

Three recurrent transplantings were made to the foreign endosperm source to determine if modifications exist in the transplanted Delair oat plants.

Foreign endosperm had some immediate effects on the grafted Delair embryos (Table 1). Differences which existed in the immediate grafted plants were not carried over into their progenies.

Rust determinations of all progenies with crown rust races 202 and 290 failed to disclose any modifications in the normal susceptible reaction of Delair to crown rust.

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*** Effect of Wetting and Shading Bags on Seed Set of Oat Crosses ***

by H. G. Marshall

The use of wet glassine bags and portable shades following hand pollination resulted in significant increases in seed set from oat crosses in the field. An experiment demonstrated that evaporation from the wet bags resulted in significantly cooler temperatures which persisted for about 20 minutes. Furthermore, this technique increased humidity during the critical period of pollen germination and pollen tube growth. The use of a wet bag also increased seed set under greenhouse conditions. Two workers pollinated 10,516 florets in the field and greenhouse from 1959 through 1961 and averaged 66 percent seed set overall using these techniques.

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*** A Selection Index ***

by J. E. Grafius

Since the selection index must be one which is used by the plant breeder, it must be easy to construct and easy to use. It must fit many populations and must be usable in many environments.

This rather large order can be accomplished with a primitive model based on only a few characters which, however, adequately measure the over-all excellence of a strain. In the present problem five complex traits were needed. These were yield, lodging susceptibility, disease susceptibility (a rating over three diseases), heading date and test weight. Note the type of trait used. These are all traits which are not components of any of the others in the primitive index. The components of these traits are considered in a more advanced index which will not be discussed here.

The next step is to write an ideal which is usually based on a standard variety. This ideal is used as a yardstick in measuring the over-all excellence of each strain. These subjective estimates of over-all excellence when compared with multiple regression estimates of excellence were found to be in very close agreement. Hence it was concluded that the subjective estimates were a satisfactory estimate of over-all excellence for a given set.

Further analysis of the problem revealed that the correlation over seasons for each of the five complex traits was the key to the accurate prediction of excellence for the following year. Where these coefficients were of similar magnitudes, the subjective estimates of excellence were as good as those from a multiple regression equation. Where the coefficients vary greatly in magnitude, then either less stress must be placed in the ideal on the traits with weak coefficients or the experimental procedure must be improved.

The crux of the problem lies in the correlations over seasons and these values should be studied in several populations. If they are thoroughly understood, then the subjective estimates of excellence over seasons can be quite adequate without having to resort to multiple regression.

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*** The Measurement of Relative Crown Rust Damage in Different Oat Varieties *

by M. D. Simons

The increasing interest in field resistance and tolerance to crown rust has prompted the investigation of suitable methods of determining the effect of this disease on a quantitative basis. A comparison of the yields of rusted and non-rusted plots has been studied as an index to tolerance. The C.V. associated with such comparisons, however, is very high. The use of average seed weight, which has certain theoretical advantages over yield, also has a relatively high C.V., but such data can be obtained from very small plots. Preliminary analysis of uniformity data from hill-plots on a rusted and non-rusted basis indicated that the C.V. for yield was about 20%, and for weight of 200 seeds, about 5%. The C.V. for percent increase in yield due to protection from rust was 72% and for a corresponding increase in seed weight (based on weight of 200 seeds), 36%. Suitable transformations of these data may result in appreciable decreases in C.V. At the present time there is some uncertainty concerning the validity of the statistical analysis of percent increases in either yield or seed weight. A split plot analysis may prove to be superior.

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*** Inheritance of Crown Rust Resistance Transferred from Avena strigosa to Cultivated Oats ***

by P. L. Dyck

The inheritance of resistance to two races of crown rust was investigated in the diploid *Avena strigosa* variety C.D. 3820, and in several lines of *A. sativa* which possess resistance transferred from the diploid C.D. 3820. The diploid species had a single dominant gene conditioning resistance to both races 264 and 294, and one or more additional genes for resistance to race 264. In the hexaploid level several lines from the 1062 cross possessed a single gene conditioning resistance to race 264, while lines from the 1052 cross had a single gene conditioning resistance to both races 264 and 294. The two genes were independent of each other. Once transferred to the hexaploid species, resistance was not as completely dominant as in the diploid.

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*** Studies on Septoria and Helminthosporium Leaf Blotches in Eastern Canada ***

by V. Clark

The Septoria disease of oats is still of major concern in Eastern Canada. The problem of finding resistant oat varieties is difficult as the best varieties and strains have no better than mild field tolerance. The wild species, especially the diploids, are somewhat more resistant but so far this resistance has not been transferred to hexaploid species.

Several studies have been carried out on the Septoria disease at Ottawa. Concerning the epidemiology of the fungus it has been found that ascospores are the principal cause of the initial infection of the disease in the spring and macrospores serve as the means of the secondary spread of the fungus.

Yield increase of approximately 20 percent were obtained when fungicides were used in an effort to control Septoria development. The best chemicals reduced disease development by about 40 percent so with better control greater increases could be expected, indicating the seriousness of yield losses due to this disease.

The nutrition of the oat plants appears to affect disease development considerably. The lower the concentration of balanced nutrients the greater the disease development. When low or high concentrations of specific nutrients cause the oat plants to develop poorly then the Septoria infection is the greatest. If plant development is good then Septoria infection is lower.

Seed treatment studies on the control of the seedling blight caused by the fungus *Helminthosporium avenae* have shown that chemical containing mercury are effective. The control of seedling blight was not necessarily associated with good emergence. Disease development was the greatest in the early part of the growing season and tapered off to none as the season advanced.

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*** Pathogenicity of Helminthosporium Isolates from Oats in Puerto Rico ***

by D. V. McKey

The results of field and greenhouse tests and field observations indicate that a Helminthosporium similar in action to Helminthosporium victoriae M and M is present in Puerto Rico and that it is native and has not been introduced. Disease symptoms similar to victoria blight have been observed in Puerto Rico winter oat rust nurseries for the last 3 years. During this period, the nurseries were grown on land never before planted to oats. A field test using selected oat varieties planted on new land indicated the causal organism to be H. victoriae. In greenhouse tests, using 43 oat varieties, Helminthosporium isolates obtained from field plants having victoria blight symptoms were compared for their reaction with known H. victoriae cultures. The leaf symptoms were similar. The only difference was that the Puerto Rican isolates were more highly pathogenic.

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*** Virus-Vector Relationships of Barley Yellow Dwarf Virus ***

by W. F. Rochow

A latent-period of barley yellow dwarf virus (BYDV) in the vector was detected following short (3 or 6 hour) acquisition feedings, but not following long (48 or 72 hour) acquisitions. When acquisition had been 48 or 72 hours, most individuals of Macrosiphum granarium transmitted the MGV strain of BYDV as readily on the first of 4 successive 1-day test feedings as they did during a final feeding begun 5 days after the aphids had been removed from the source plant. When short (3 or 6 hour) acquisition feedings were used, individuals of M. granarium that transmitted rarely did so during the first 24 hours after they were removed from the source plant. For example, following a 3-hour acquisition feeding, only one of 25 aphids transmitted during the first day, about half of the aphids transmitted on the second, third, and fourth days, but 22 of the 25 transmitted during a final 1-week feeding period begun 5 days after they had been removed from the source plant.

Similar results were obtained in tests with Rhopalosiphum padi and the strain of virus (RPV) transmitted specifically by this species except that this aphid appeared to transmit less readily during the first 24 hours than did M. granarium, even following long acquisition feedings. For instance, following a 48-hour acquisition feeding, 11 of 17 individuals of R. padi transmitted during the first day, 11 of 17 transmitted during the second day, 13 of 17 transmitted during the third day, 12 of 17 transmitted during the fourth day, but 16 of 17 transmitted during a final 1-week feeding that began 5 days after the aphids had been removed from the source plant.

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*** Problems and Progress in Evaluating Spring and Winter Small Grains and in Particular Oats for Tolerance to Barley Yellow Dwarf Virus ***

by Henry Jedlinski

Barley Yellow Dwarf Virus (BYDV) at the present time cannot be controlled satisfactorily, however, damage in oats can be reduced by growing less susceptible varieties and by giving proper attention to certain cultural practices. Tolerance, a most unfavorable type of resistance to virus diseases known, is the best type so far detected in oats. Most confusion in testing oat strains for tolerance to BYDV results from the failure to differentiate the disease incidence from the disease severity. If the disease incidence is used as a criterion in the evaluation of disease resistance indiscriminately, without any attention to the intrinsic interaction between the macro and micro environments, aphid vectors, virus and the plant host, resistant varieties developed from such a program will be of a rather short duration.

At Illinois attempts were made to test the reaction of oat strains to BYDV infection under greenhouse and field conditions. In all cases a control was exercised over methods of inoculation, time of infection, vector identity, virus strains, age of plants when infected and evaluation of the disease reaction. Thus, reproducible results were obtained which enhanced the screening and breeding program for disease resistance.

Oat workers interested may obtain seed of the tolerant oat strains developed at Urbana, Illinois by writing to Dr. C. M. Brown, Agronomy Department, University of Illinois or to the author.

Relative Scale for Appraising Disease-Severity on Oats Due to Barley Yellow Dwarf Virus Infection Under Field Conditions

0.0 - Immune. No symptoms, virus cannot be recovered.
0.1 - Tolerant. Panicle produced; spikelet number may be reduced up to 20%; very mild or no apparent stunting (very mild symptoms).
1.0 - Moderately Tolerant. Panicle produced; spikelet number reduced up to 40%; slight stunting (mild symptoms).
2.0 - Slightly Tolerant. Panicle produced; spikelet number reduced up to 60%; moderate stunting (moderate symptoms).
3.0 - Very Slightly Tolerant. Panicle usually produced; spikelet number reduced up to 80%; severe stunting (severe symptoms).
4.0 - Intolerant. No panicle produced, in most instances; plants may die prematurely; if panicle produced, most florets sterile; very severe stunting (very severe symptoms).

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*** Heritability of Resistance to Barley Yellow Dwarf Virus in Oats ***

by George E. Brown and J. M. Poehlman

Inheritance of reaction to barley yellow dwarf virus, as measured by percent of leaf area damaged, was studied in five crosses. The parent varieties and their reaction to the disease are as follows: C.I. 7448 [(Victoria x Hajira-Banner) x (Victory x Hajira-Ajax)] x Mo. 0-205^2, tolerant; C.I. 7447, sister selection to C.I. 7448, intermediate; Tonka, Nodaway, and C.I. 7235, Rodney x Landhafer-Forvic, susceptible. These studies indicate tolerance to BYDV to be inherited in a quantitative manner.

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*** Inheritance of Tolerance to Barley Yellow Dwarf Virus in Oats ***

C. M. Brown and Henry Jedlinski

Albion, an oat variety that has been the most tolerant of BYDV of the hexaploid varieties tested in Illinois was crossed with the highly susceptible variety C.I. 7451 and the somewhat less susceptible variety Minhafer.

Ten F_1 plants of Albion x Minhafer all appeared to have tolerance equal to Albion indicating that tolerance in this cross was dominant. Approximately 3/4 of the F_2 plants tested appeared to have tolerance superior to the susceptible parent, Minhafer, indicating that the two varieties differed by a single dominant gene for tolerance. However, the occurrence of F_2 plants with a BYDV reaction intermediate between the two parents indicated that one or more minor or modifying genes were also present. In the backcross of the susceptible parent approximately 1/2 of the plants were resistant or intermediate and approximately 1/2 were susceptible giving additional evidence for a single dominant gene for tolerance.

The BYDV reaction of 6 F_1 plants of Albion x C.I. 7451 was intermediate between the two parents. No definite segregation pattern could be established in the F_2, but B.C. data along with F_1, F_2, and F_3 indicated the possibility of a dominant gene for susceptibility in C.I. 7451 and a dominant gene for resistance in Albion. Very likely minor or modifying genes were also involved.

The data observed to date is not adequate to determine precisely the mode of inheritance of tolerance, but this data along with the successful transfer of tolerance through 5 successive backcrosses using Albion as non-recurrent parent definitely indicate that tolerance in Albion is rather simply inherited and can be transferred easily by conventional plant breeding techniques.

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*** Use of Systemic Insecticides for the Control of Barley Yellow Dwarf Virus Infection in Oats ***

Henry Jedlinski, J. H. Bigger and C. M. Brown

In 1960 the aphicidal activity of Di-Syston (0,0-Diethyl S-2-(ethylthio) ethyl phosphoro-dithioate) and in 1961 that of Dimethoate (0,0-dimethyl S (N-methylcarbamoyl-methyl phosphorodithioate) and Thimet (0,0-Diethyl S-(ethylthio) methyl phosphorodithioate) was tested under field conditions using oats and bird-cherry oat aphid (Rhopalosiphum padi (L.)), in the third instar or older including apterous and alate forms. At the same time it was determined whether these systemic insecticides could prevent the treated plants from becoming infected with barley yellow dwarf virus (BYDV). Through the use of a Columbia planter Di-Syston was applied in a granular form at 1 1/2-2 lb. of active material per acre as a side-dressing. Thimet was used in the form of a seed treatment at the rate 1/2 lb. (active material) to 63 lbs. of seed. Dimethoate was sprayed as water emulsion at the rate of 1.07 lb. (active material) to the acre. The plants were sprayed with Dimethoate on May 18 when they had reached the advanced two-leaf stage. Adequate aphid kill was obtained with Di-Syston and Dimethoate but not with Thimet which reduced the stand only. None of the oat plants treated with the three insecticides escaped BYDV infection, although practically all viruliferous aphids were killed within a period of 8-24 hrs. after infestation. The treatments with the systemic insecticides did not change the BYDV incubation period in the treated plant host. Persistence of Dimethoate and Thimet in the plants as an aphicide and the performance of different yield components of the insecticide-treated and untreated BYDV infected and healthy oats was measured. Both objectives were accomplished by infesting the plants with viruliferous R. padi 1, 4, 8, and 16 days after application of Dimethoate.

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*** Studies on the Soil-borne Oat Mosaic Virus ***

by R. W. Toler and T. T. Hebert

Oat mosaic, caused by the soil-borne virus Marmor terrestre McKinney, has become increasingly important in North Carolina, and neighboring states, and recently was reported as far west as the state of Washington. When this study was initiated in 1958 little basic information was available concerning the properties of the oat mosaic virus in the soil and in vitro. The properties of the virus had not been studied primarily because of low levels of transmission obtained with the commonly used manual inoculation techniques. Control of the disease has depended primarily upon the development and use of resistant varieties. In recent investigations efficiency of transmission of the virus was increased in infective juice by subjecting plants to warm temperatures and high levels of nitrogen prior to inoculation, and by applying the inoculum with an artist's airbrush. Optimum temperature for symptom expression is near 18°C. Properties of the virus observed in crude juice included a thermal inactivation point 46°C, a dilution end point of 1 to 100 by the carborundum wipe method of inoculation and 1 to 1000 by airbrush inoculation. Maintaining infective sap at pH levels of 3 or below and 11 or above for 10 minutes at 20° C inactivated the virus and crude juice adjusted to pH 7, 8 and 9 was not infectious after filtering through a Seitz EK filter disk or a UF fritted glass filter. In experiments on maintaining virus activity in storage, crude infective juice lost infectivity when stored 48 hours at 20°C. However, the virus remained active for 135 days in leaf tissue disiccated over calcium chloride at 2° C, 147 days in frozen leaf tissue, 204 days in frozen juice and 234 days in lyophilized juice. Three species of aphids and 9 species of fungi failed to transmit the virus to healthy oat plants. Factors affecting transmission of the virus in infected soil were studied as they previously had received little attention. Thermal inactivation of virus in the soil was attained after 56°C for10 minutes, and naturally-infested soil contained infectious virus after storage at 2°C for 5 years and after being airdried and stored at room temperature for 2 years. The fraction of soil containing most virus activity passed through a screen with 53 micron openings but was largely retained on a screen with 44 micron openings. Oat plants when grown in naturally-infested soil were found to be susceptible at 1 to 8 weeks of age with the optimum soil temperature for infection near 15° C. The reactions of oat varieties to inoculation with infective juice in the greenhouse were not correlated with field resistance to oat mosaic in naturally infested soil. The absence of differences in reactions of varieties and strains to inoculations with 4 isolates of the virus indicates that the isolates used may be the same strain. Fifty-four accessions of *Avena* species were screened by inoculating with infective juice. One species, *Avena strigosa saia* accession number 4639, exhibited a high level of resistance whereas 5 accessions exhibited mottling symptoms more severe than those observed previously on other oat varieties and strains. The genus *Avena* is the only known host of oat mosaic. In the host range study, 79 species of plants in 20 families were inoculated with infective juice. None of these plants proved to be susceptible to the oat mosaic virus, as based on lack of symptom development when reinoculated on to a susceptible oat variety.

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*** Preliminary Results of the Crosses Involving Greenbug Resistance in Oats ***

J. H. Gardenhire

Greenbug resistant varieties and strains of oats have been found in screening the world collection. Several of these have been used in crosses in an attempt to determine the mode of inheritance of greenbug resistance. Siberian, C.I. 1712, and Russian 77, C.I. 2898, have been used as a source of resistance. However, in recent tests Russian 77 appears to be more resistant than Siberian. From the cross New Nortex x Siberian, 120 F_3 families from spaced F_2 plants tested no resistant families were found; however, 60 of the families were segregating for resistance and 44 were susceptible. Sixteen families were not rated because of poor stands and seedling diseases.

Information obtained so far from the cross Russian 77 x RRP-V-R-Ranger, indicates that greenbug resistance in the variety Russian 77 is controlled by a single dominant gene. In some instances the susceptible families lived from 1 to 2 days longer than the susceptible parent. Although, these are only preliminary results and incomplete it does indicate that the resistance in Russian 77 is controlled by a single dominant gene.

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*** Seed Treatment of Oats ***

by Earl D. Hansing

Extensive experiments on seed treatment of oats have been conducted in Kansas during the last 3 decades. During and prior to this period formaldehyde was principally used. Although formaldehyde was satisfactory for the control of oat smut it was difficult to apply, somewhat phytotoxic, and not valuable in the control of seed rot and seedling blights.

The first major contribution in the improvement of seed treatments for oats came in 1935 with the introduction of ethyl mercury phosphate (New Improved Ceresan). This product was a volatile organic mercurial in a powder carrier. Its value was in ease of application and that the seed did not have to be covered completely with the fungicide. The volatile mercurial would disperse throughout the seed as well as penetrate underneath the lemma and palea to prevent chlamydospores of _Ustilago_ spp. as well as spores of other fungi from germinating. In addition some of the chemical remained on the seed to control fungi in the soil which could cause seed rot and seedling blights. Its disadvantage was poisonous dust in the air during the treating, handling, and planting operations.

The next important contribution came in 1946 with the introduction of ethyl mercury p-toluene sulfonanilide (Ceresan M). Although this mercurial was in a powder carrier it could be mixed with water and the suspension used to treat oat seed. This eliminated the poisonous dust in the air during the treating operation, however the water would evaporate and there would be poisonous dust in the air during the handling and planting operations.

In 1950 another mercurial was made available, methyl mercury dicyandiamide (Panogen) in a liquid carrier. This was a major breakthrough in oat seed treatment. If a suspension was better than a powder, why not go all the way and use a solution. This eliminated the dust in the air during the treating, handling, and planting operations. Only a small amount of the material was used to treat a bushel of seed, increasing its moisture by less than 1%.

Since 1950 volatile organic mercurials in liquid carriers have principally taken over as seed treatments of oats. Seed treatments which have been tested sufficiently and which are recommended are: ethyl mercury acetate and ethyl mercury 2,3-dihydroxy mercaptide (Ceresan liquids), methyl mercury nitrile

(Chipcote), and methyl mercury 8-hydroxyquinolate (Ortho LM).

Experimental seed treatments which are now being tested are: sodium ethyl mercury thiosalicylate or thimersol (Elcide 73), and ethyl mercury acetate and methyl mercury 2,3-dihydroxy propyl mercaptide (Experimental No. 2547).

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*** The Occurrence of Snow Mold on Winter Oats in Pennsylvania ***

by H. G. Marshall

Snow mold was the major cause of winter killing of winter oats in Pennsylvania during 1961. Killing ranged from a low of 26 percent for C.I. 7754 to a high of 80 percent for C.I. 7502 at one location. No completely resistant lines or varieties were noted, but certain varieties were apparently tolerant. The varieties Ballard and Wintok, generally considered among the most winter-hardy varieties, were very susceptible. Norline showed relatively little killing and was superior in this respect to Dubois. Surviving plants grew slowly in the spring and many had various degrees of root and crown rot.

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*** The Effect of Seed Source on the Cold Resistance of Winter Oats ***

by E. J. Kinbacher

An extensive study to investigate the effect of seed source on cold resistance of winter oats was initiated. Foundation seed of Dubois was increased at Aberdeen, Idaho the summer of 1960. This seed was sown for increase the fall of 1960 at 11 locations (New York (2), Pennsylvania (2), Maryland, Virginia, Kentucky, Illinois, Arkansas, Missouri, and Oklahoma). Significant differences in cold resistance of pre-emerged seedlings were found among the 11 seed sources. Analyses of seed for N, P, K, Ca, Mg, and Fe has not yet provided significant information on the nature of the difference in cold resistance among the seed sources. More refined chemical analyses are now in progress to determine the nature of this difference in cold resistance. Two, three, four and five-week-old plants are also being tested to determine how long in the life of the plant differences in cold resistance due to seed source prevails.

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***Influence of Seeding Methods on Small Grain Yields and Alfalfa Establishment ***

by D. C. Hess, H. L. Shands and Z. M. Arawinko

In 1958 an experiment was cooperatively arranged between the Departments of Agronomy and Soils of the University of Wisconsin and the John Deere Van Brunt Company in an attempt to answer questions concerning small grain plant response to different row widths, fertilizer placements, seeding depths and other seeding method variations. Most of the seeding was that of oats and was done with a John Deere research drill (XD-1). Grain row widths varied from 4 1/2 inches to 14 inches. The 14-inch width plots had decreased yields during the first two years and were then discontinued. Fertilizer placements varied from with-the-seed to midway between the rows; but apparently had little effect on yields and other agronomic characters measured. One- and 2-inch grain planting depths gave adequate and approximately equal stands.

In 1960 and 1961 yield and other plant characters were studied for their response to conventionally prepare seedbeds and also less well prepared seedbeds. Less preparation plots had lower yields in 1960, but about the same as better prepared plots in 1961. Other variables included in the experiments were alfalfa row widths, packing wheels for alfalfa and grains, grain seeding rates, and grain varieties. Satisfactory grain stands, yields, and alfalfa establishment were had using the XD-1 drill which sowed grain and alfalfa and applied fertilizer in one operation.

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*** Spring Oat Silage Preceding Soybeans ***

Dale A. Ray

Increased interest in oats as a silage crop in Ohio has brought inquiry as to a possible grain crop which could be produced following the silage harvest. Soybeans was proposed as one alternative with adaptation for June seeding.

Clintland and Rodney spring oat varieties of medium-early and late maturity, respectively, and Monroe, Hawkeye and Clark soybean varieties, representing in order, medium-early, mid-season and late maturity, were selected for study. The randomized complete-block design was used with four replications of the five crop varieties harvested for grain and the three soybean varieties produced following the harvest of each of the two spring oat varieties for silage. The oat silage was harvested in the late-milk to early- dough stage with a plot mower, and the grain plots were harvested with a farm combine. The Clintland oat-silage plots were harvested and immediately seeded to soybeans approximately one week earlier than the Rodney silage plots.

The relative performance of the oat varieties for silage yield and of the soybean varieties for grain following oat silage harvest in the three-year study from 1959 through 1961 varied from season to season. The average silage yield for Rodney oats was approximately 2.4 tons per acre higher in green-weight and 800 pounds per acre higher in dry-weight than Clintland oats. In 1959 the soybeans seeded after both silage harvests failed to develop acceptable stands due to insufficient soil moisture. Soybeans following Clintland-silage harvest produced 11.5 and 2.0 bushels per acre higher yields in 1960 and 1961, respectively, than when seeded after the Rodney oat-silage harvest. Soybeans seeded following Clintland and Rodney silage harvests produced one-half and one-third, respectively, the yields obtained in the 1960-61 soybean check-plots. Although the yields of the three soybean varieties seeded after oat-silage harvest were significantly lower than the yields of the varieties when seeded alone according to normal practice, soybeans may be considered as one alternative grain crop to utilize the remainder of the growing season.

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*** Heritable Factors for Compatibility and Fertility in Crosses to Avena sativa possessed by an autotetraploid of A. strigosa ***

by F. J. Zillinsky

A selection from an autotetraploid of A. strigosa obtained from Dr. I. Nishiyama of Japan was observed to be highly cross compatible to A. sativa and the hybrids produced seed more readily than other autotetraploid of A. strigosa. By crossing this autotetraploid selection to the autotetraploid C.D. 3820 and using the progenies of the hybrid in crosses to A. sativa it was found that the average cross compatibility was increased from 5 percent to 22 percent and the proportion of hybrid plants which produced seed increased from 13 percent to 63 percent. It is expected that this selection can reduce the estimated average number of cross pollinations between autotetraploid and A. sativa necessary to obtain a partially fertile F_2 plant from 1000 or more to 10 or 15.

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*** Oat Improvement in the Andean Zone of Colombia ***

Charles F. Krull, Juan Orjuela N. and Reinaldo Reyes N.

While the potential for oat production in Colombia is very high, all lines that have been tested to date are susceptible to the field complex of stem rust races. This includes all of the lines in the International Oat Rust Nursery, the USDA World Oat Collection, Uniform Oat Rust Nursery, the progeny of some 1,200 locally made crosses, and lines from various other sources in the United States and other countries. Additionally a single race (locally designated as

6C) can attack any line of the approximately 5,000 lines so far tested in addition to the usual standard and supplementary stem rust differentials. The consequences to the North American oat industry of the inadvertent introduction of such a virulent race could be quite serious. Material is still being sought and screened in the search for resistance to these races. The possible utilization of susceptible lines or lines with only partial resistance is being studied in case that a higher type of resistance cannot be found.

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III. SPECIAL REPORTS

*** Seedling Pubescence - A Possible further Character Indexing Winter Hardiness in Oats ***

by Franklin A. Coffman

It long has been recognized that some characters are common to winter hardy oats. Among such are prostrate (turflike) habit in juvenile plant growth, decidedly slow plant development, usually narrow leaves, and, according to Tavcar (Tavcar, Alois: Zt. Pflanzenzucht. 15(2): 63-74. 1930), that growing points are deeper in the soil than those of spring oat varieties. Information now available indicates that hardy oats are characterized by much pubescence on the leaf sheaths, leaf margins, and even leaf surfaces.

In the fall of 1961, plantings were made of each of some 375 entries in the U. S. Department of Agriculture classification nursery. This nursery includes all hexaploid oats now grown and most of those previously of interest from the agronomic, pathologic, or the morphological standpoint in North America.

The seedlings were sown late in the fall in greenhouse pots, with practically no benefit from artificial heat for from 5 to 6 weeks. Detailed notes were taken on juvenile plant characters of all seedlings. In recording these notes, it was observed that comparatively few entries were described as having very pubescent leaf sheaths, leaf margins, leaf surfaces, and backs.

On listing the unusually pubescent oats, the results were as follows:

Superior Hardiness

C.I. No.	Variety	C.I. No.	Variety
3168	Fulwin	6572	Dubois
3424	Wintok	6980	Ballard
5118	Colwin	7480	Wint. Sel. x H. Culb.
5364	Nysel	7603	Excel

Hardy

C.I. No.	Variety	C.I. No.	Variety
480	Boswell	3855	Stanton
947	Tech	4060	Florilee
2499	Pentagon	5106	Cimarron
2505	H. Culberson	6571	Bronco
3296	Winter Turf	6717	Sib. of Bronco
3392	Letoria	7765	[(RRxV-R) x Sib. 4316] x (Cl^2 - S.F.)
3393	Lenoir		

Moderately Hardy

C.I. No.	Variety	C.I. No.	Variety
4078	Quincy Red	4220	Delta Red 88

Spring Oats

C.I. No.	Variety	C.I. No.	Variety
1947	Archangel	2884	So. Dak. 334

Admittedly, a few entries apparently lacking in winter hardiness appear in the list. A check is being made in such cases to determine whether mislabeling or mixtures could have occurred, but the fact remains that among some 375 oats grown, of which about 125 usually are considered winter and 250 spring varieties, nearly all entries classed as being unusually pubescent were hardy winter varieties. Further, every extremely hardy oat among all those included was described as being very hairy in the juvenile state. Thus, a fifth character now appears available for characterizing winter hardy oats.

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*** Protein and Digestible Laboratory Nutrients in Oat-Pasture Forage Irrigated with City Sewage Effluent ***

by A. D. Day, M. G. Vavich, and T. C. Tucker[1]

An experiment was conducted over a two-year period (1957 and 1958) at Cortaro, Arizona, to compare the protein percentage and digestible laboratory nutrient (D.L.N.) percentage in Palestine oats pasture forage irrigated with sewage effluent with the protein and D.L.N. in oats irrigated with well irrigation water and fertilized with different amounts of commercial fertilizer. The soil was a Gila silt loam. The 10-year (1941-1950) mean precipitation for the area during the oat growing season (December through March) was 2.98 inches.

The data for the two-year average protein percentage and D.L.N. percentage in oats pasture forage for the four irrigation and fertilizer treatments are given in Table 1. The protein content of the forage was 12.74% on the control plots and 22.09% on the plots that received sewage effluent. The D.L.N. percentage in the forage was 77.5% and 74.0% on the control plots and the plots that received sewage effluent, respectively. When oats pasture forage was grown with sewage effluent, it contained approximately the same amounts of protein and D.L.N. as when it was irrigated with well water and fertilized with nitrogen, phosphate, and potash from commercial fertilizers in amounts equivalent to those supplied in sewage effluent.

The response of barley to sewage effluent when grown for pasture forage was similar to that obtained from oats. However, the average protein and D.L.N. percentages in oats forage were a little higher than in barley forage.

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[1]Agronomist, Agricultural Biochemist, and Soil Scientist, Arizona Agricultural Experiment Station, University of Arizona, Tucson, Arizona, respectively.

Table 1. The average protein percentage and digestible laboratory nutrient (D.L.N.) percentage in pasture forage from Palestine oats grown with different irrigation and fertilizer treatments at Cortaro, Arizona, in 1957 and 1958.

Irrigation and fertilizer treatment	Two-year average percentage Protein	D.L.N.
1. Well water with no additional fertilizer (control)	12.74	77.5
2. Well water with 100 lbs. N, 75 lbs. P_2O_5, and 0 lbs. K_2O	21.24	73.0
3. Well water with 200 lbs. N, 150 lbs. P_2O_5, and 100 lbs. K_2O	22.25	76.0
4. Sewage effluent with no additional fertilizer or water	22.09	74.0

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*** Report from Cooperative Rust Laboratory at St. Paul, Minnesota ***

by B. J. Roberts, D. M. Stewart, and R. U. Cotter

Sources of Resistance to Subraces 6A and 13A of Oat Stem Rust

The results of testing varieties and species of oats for sources of resistance to subraces 6A and 13A of oat stem rust are summarized in Tables 1, 2, 3, and 4. The resistance of some of these oats has been described by Browning and Green. The species designation in Tables 1, 2 and 4 are those given in the key to the collection.

Some of the better sources of resistance to oat stem rust appear to be C.I. 4021, 4022, 4023, 4541, 5907, and 5937. All are highly resistant to most of the races and subraces.

Response of Varieties to Damage by Stem Rust

Nature and extent of damage caused by stem rust was studied for two years in 27 varieties and 39 varieties the second year. The performance of a variety was evaluated by determining the reduction in yield and quality when the variety was grown under rusted and non-rusted conditions. A severe epiphytotic of race 8 was induced in the rusted plots in the field by inoculating rust spreader rows and allowing the rust to spread into the test areas. Non-rusted plots were kept free of rust by sprays with a fungicide. The inoculations were timed so that the rust moved into the rusted plots at heading time. Five factors of yield and quality were studied: 1) bushel/acre, 2) test weight, 3) 200-kernel weight, 4) 200-groat weight, and 5) percent of groats.

Table 1. List of oat varieties, selections, and species selections resistant to subrace 13A of oat stem rust. B. J. Roberts, University of Minnesota. 1962.

C.I. P.I.	Variety, Selections, or Species	Source
1001 1/	Hajira	Transvall
1575	Hull-less	Oregon
1880 1/	Joanette	Missouri
2108	Abyssinian *A. abyssinica*, White Abyssinian	Abyssinia
2109	*A. abyssinica*	Abyssinia
2110	Gray abyssinian	Abyssinia
2113	*A. abyssinica*	Africa
2412 1/	Unnamed	China
2413 1/	Unnamed	China
2465	Hull-less *A. nudibrevis*	Russia
2519	*A. abyssinica* Black abyssinian	Africa
2520	*A. strigosa* No. 1	New York
2521	*A. strigosa* No. 2	New York
2566	LaSalle	Canada
2641	Spokane Hull-less	Canada
2659	Strain 703	Canada
2660	Jostrain	Canada
2710	Unnamed	China
2824	Illinois Hull-less	Oregon
2869	Dickson No. 458 (*A. pilosa*)	Russia
3030	Hull-less type H A 14	Africa
3031	Hull-less type H. C. 1	Africa
3037	Kherson No. 27	Africa
3038	Kherson No. 99	Africa
3039	Kherson No. 22	Africa
3040	Kherson No. 34	Africa
3436	*A. brevis*	Brazil
CD3820	*A. strigosa*	Unknown
3814	*A. strigosa*	Poland
3816	*A. strigosa*	Poland
4021 1/	Victoria x (S-524) H-B	Canada
4022	Victoria x (S-524) H-B	Canada
4023	Hajira x Joanette	Canada
4024 1/	Canuck: Hajira x Joanette	Iowa
4134	Roxton: (Sib x Joan) x (OAC 72 x Early Ripe)	Canada
4541 1/	Victory x (Victoria x H-B) R.L. 1721	Canada

Table 1 continued

4639	A. strigosa var. Saia	So. America
4747	A. strigosa var. typica	Russia
4751	A. abyssinica	Russia
4752	A. abyssinica	Russia
5057	A. strigosa	Russia
5082	3381 (0) A. strigosa Oscura	Canada
5197	A. fatua	India
5198	A. fatua	India
5200	A. sp.	India
5201	A. fatua	India
5202	A. fatua	India
5870 1/	Sac x (H-J)	Iowa
5907 1/	(Bond-Iogold) x (VHB)	Minnesota
5927	Ransom: Sac x (H-J)	Iowa
5937 1/	Victoria x (H-B) Fultex	Texas
6552 1/	Santa Fe x Hajira	Iowa
6680 1/	(Sac x H-J) x Landhafer	Iowa
6816 1/	Canuck: Hajira x Joanette	Canada
6817	Canuck: Hajira x Joanette	Iowa
6824	Landhafer x (Sac x H-J)	Iowa
6858	Unnamed (Probably A. strigosa)	Turkey
6954	A. strigosa var. Saia	Iowa
6956	A. strigosa	Iowa
7010	A. strigosa var. Saia (Rust Tester)	Iowa
7114	(Cl^2-Ark 674) x (D69-Bond x H-J x Victoria)	Indiana
7119	A. strigosa	Canada
7280	A. strigosa	Unknown
7438	Hajira x Banner: R. L. 524.1	Iowa
186606	A. strigosa var. Saia	Brazil
193958	A. sp.	Ethiopia
194201	A. strigosa var.	Uruguay
194893	A. sativa	Ethiopia
194895	A. sativa	Ethiopia
194896	A. sativa	Ethiopia
194897	A. sativa	Ethiopia
195550	A. sp.	Ethiopia
196835	A. sp.	Ethiopia
197400	A. sp.	Ethiopia
218062	Unnamed	Unknown

1/ Original sample tested to subrace 13 A was mixed with resistant and susceptible plants.

Table 2. List of oat varieties resistant to subraces 13A and 6A of oat stem rust at temperatures up to 78° F. B. J. Roberts. University of Minnesota. 1962.

C.I. No.	Variety	Source
4639	Saia	So. America
6954	Saia	Iowa
7010	Saia Rust Tester	Iowa
186606	Saia	Brazil
6858	*A. strigosa*	Turkey
2108	*A. abyssinia*	Abyssinia
2109	*A. abyssinia*	Abyssinia
3030	Hull-less type HA 14	Africa
2641	Spokane Hull-less	Canada
1575	Hull-less	Oregon
3037	Kherson No. 27	Africa
3038[1/]	Kherson No. 99	Africa
3939	Kherson No. 22	Africa
3040	Kherson No. 34	Africa
1001[1/]	Hajira	Transvaal
5907[1/]	(Bond-Iogold) x (VHB)	Minnesota
4134[1/]	Roxton	Canada
5937	Victoria x (H-B) Fultex	Texas
7438	Hajira x Banner R.L. 524.1	Canada
4021	Victoria x (S-524) H-B	Canada
4022	Victoria x (S-524) H-B	Canada
4023	Hajira x Joanette	Canada
4541	Victory x (Victoria x H-B) R.L. 1721	Canada
2412	Unnamed	China
2413	Unnamed	China
2710	Unnamed	China

[1/]Original sample from World Collection had resistant and susceptible plants.

Table 3. Seedling response of 36 oat strains to races 6, 6A, 7A, 8, 8A, and 13A of oat stem rust in greenhouse tests at 75° and 85°F.

C.I. P.I. No.	Race 6 75°	Race 6 85°	Subrace 6A 75°	Subrace 6A 85°	Subrace 13A[1] 75°	Subrace 13A[1] 85°	Subrace 7A 75°	Subrace 7A 85°	Race 8 75°	Race 8 85°	Subrace 8A 75°	Subrace 8A 85°
4639	0;-3	0;-4	0;-1	0;-3	0;-1	0;-4	0;-1	0;-3	0;-1	0;-3	0;-3	0;4
6954	0;-3	0;-4	0;-1	0;-3	0;-1	0;-4	0;-1	0;-4	0;-1	0;-3	0;-3	0;-4
7010	0;-3	0;-4	0;-1	0;-3	0;-1	0;-4	0;-1	0;-3	0;-1	0;3	0;-3	0;-4
186606	0;-4	0;-4	0;-1	0;-3	0;-1	0;-4	0;-1	0;-3	0;-1	0;-3	0;-3	0;-4
6858	0;-4	0;-4	0;-1	0;-3	0;-1	0;-4	0;-3	0;-3	0;-1	0;-3	0;-3	0;-4
3030	1-3	3,4	2	3,4	1	3,4	1	3,4	1-3	3,4	2-3[3]	3-4
3031	1	3,4	2	3,4	1-3	3,4	1-3	3,4	1-3	2 [3]	3	3-4
2641	3,4	3,4	2-3[3]	3,4	1	3	2-3	2-3	3-2		3,4	3
1575	3,4?	2-3?	R?	3,4	1-3	3,4	1-3	2-3	2-3	2-3	3,4	3,4
3037	2-3	3,4	2	3,4	0;-1	3,4	3,4	3,4	2-3	3,4	2-3	3-4
3038	2-3	3,4	2-3[3]	3,4	1	3,4	3,4	3,4	2-3	3,4	2-3	3-4
3039	2-3	3,4	2	3,4	0;-1	3,4	3,4	3,4	2-3	3,4	2-3	3-4
3040	2-3	3	2-3	3,4	1	3,4	2-3	3,4	2-3	3,4	2-3	3-4
1001	1-2	3,4	2 [3]	4	1-2	3,4	2[3]	1 [3]	2 [3]	3,4	3,4	3-4
1880	3,4	3,4	3	4	0;-3	3,4	3,4	3,4	3,4	3,4	4	3-4
2660	3	3,4	3	4	0;-3	3,4	3,4	3,4	3,4	3,4	4	3-4
2659	4-2	3,4	3,4	3,4	0;-3	3,4	3,4	3	3,4	3,4	3-4	3-4
6817	0;-1	3,4	3,4	3,4	0;1	3,4	2-3	3,4	1-2	3,4	3-4	3-4
4024	0;-2	3,4	3	4	1-4	3,4	3,4	3,4	2	3,4	3-4	3-4
5907	1	3,4	2 [3]	3,4	1-3	3,4	1	1-2[3]	1	3,4	3-4	3-4
7114	1	3,4	3,4	4	1	3,4	3,4	3,4	1	2	2-3	2-3
6824	0;-1	3,4	3,4	3,4	0;-3	3,4	3,4	3	1-2	3,4	4	4
5870	0;-2	3,4	3,4	3,4	0;-3	3,4	1-2	2-1	1-2	3,4	3-4	4
5927	1-2	3,4	3,4	3,4	0;-4	3,4	0;-2	2-1	1-2	3,4	3-4	3-4
6680	0;-2	3,4	3,4	3,4	1-4	3,4	3,4	3,4	1-2	3-2	3-4	3-4

Table 3 continued. Seedling Response

C.I. P.I. No.	Race 6 75°	Race 6 85°	Race 6A 75°	Race 6A 85°	Race 13A 75°	Race 13A 85°	Subrace 7A 75°	Subrace 7A 85°	Race 8 75°	Race 8 85°	Subrace 8A 75°	Subrace 8A 85°
4134	3,4	3,4	2 [2]	4	1-4	3,4	3,4	3,4	3,4	3,4	3-4	3-4
5937	2	4	2	3	1-3	3			1-3[3]	4	4	4
4021	1	3,4	2	3	1-2	3,4	1	3,4	1-2	3,4	2-3	3-4
4022	1	3,4	2	3	1	3	1-3	3	1-2	2	2-3	2-3
4541	1	3	2	3	1-2	3	1-3	3	1-2		2-3	3
2108	2-3	4	2-3	3,4	1-3	3	1-2	2-3	2	3-2	3-2	3-4
2109	2-3	4	2-3	3,4	1-3	3	1-2	3-2	1-2	3-2	3	3-4
194896	3,4	3,4			2	4	0;1	2	0;-1	2	2-4	2-3[3]
2412	2-3[3]	3,4	2	3,4	2[2]	3	1-2[3]	1-2[3]	2-3	3,4	2-3[3]	3,4
2413	2 [3]	3,4	2	3,4	2[3]	3	0;-1[3]	1-2[3]	2-3[3]	3,4	2-3[3]	3,4
2710	2-3	3,4	2	3,4	2	3,4	2-3	3,4	2-3	3,4	2-3	3,4

[1] Culture number 59-B30-144

[2] Limited number, infection sites, response questionable

[3] Selection mixed or segregating; response given for resistant plants.

Table 4. List of stem rust resistant selections from World Collection of non-cultivated oats and their seedling response to race 6 and subrace 13A in greenhouse at 75°F.

C.I. P.I.	Species or Selection	Seedling response at 75°F. Race 6	Subrace 13A
2108	Abyssinian A. abyssinica, White	2,3	2,3
2109	Av. abyssinica	2,3	2,3
2110	Gray Abyssinian	2,3	2,3
2113	Av. abyssinica	2,3	3±
2519	A. abyssinica, Black abyssinian	1,2,3	3,2
4751	A. abyssinica	2,3	3,2
4752	A. abyssinica	2,3	2
7233	A. abyssinica	3,2	2,3
			2,3
2465	Hull-less A. nudibrevis	2,3	2,3,4
4639	A. strigosa saia	0;1	0;1
4746	A. strigosa var. tipica	0;,1,3	0;1
4747	A. strigosa tipica	0;,1,3	0;1,2
5057	A. strigosa	0;1,2,3	0;1,2,3
6956	A. strigosa	0;1;X	0;4p1S
7280	A. strigosa	0;1	0;
CD3820	Unnamed	0;1	0;
3814	A. strigosa	3±	3,2;2p10;
3916	A. strigosa	3±	3,2
3436	A. brevis	--	0;
2869	Deckson No. 458 (A. pilosa)	4-1	1,2
5197	A. fatua	2,3;S	2,3
5199	A. fatua	2,3	2,3
5201	A. fatua	2,3	1,2,3
5200	A. sp. (selection A)	2,3	2
5200	A. sp. (selection B)	4	5p14;4p12,3
193957	A. sativa	2,3	2,3
193958	A. sp.	2,3	2,3
194893	A. sativa	2,3	2,3
194895	A. sativa	2,3	2,3
194897	A. sativa	2,3	2,3
195550	A. sp.	2,3	2,3
196835	A. sp.	2,3	2,3
197400	A. sp.	2,3	2,3
218062	Unnamed	2,3	2,3
2466	A. barbata, Slender Oats	3±	3±
181007	Collection No. 11085 (Selection C)	3±	3=,3
221435	Unnamed	3±,4	3±,4

It was found that varieties classed as resistant differed considerably in the amount of damage caused by rust. Similarly, among varieties classed as susceptible some were more severely damaged than others. Rust did not affect all the five factors for yield and quality in the same way. In some varieties bushels per acre were greatly reduced, while in other varieties the greatest reduction occurred in test weight. In general, bushels/acre appeared to be most sensitive of the characters affected by rust. The selections of better performing varieties to the damaging effects of rust depended upon the methods of measuring damage and upon the year.

Virulence in the Oat Stem Rust Fungus

New cultures of oat stem rust have been obtained from the physiologic race survey made by Dr. D. M. Stewart, and from rust hybrids produced by Dr. R. U. Cotter. These cultures attack oat varieties and selections of *Avena* spp. known to be highly resistant to stem rust.

In 1961 cultures of race 6 that were virulent on a number of varieties that have resistance to 6A and 13A were obtained in the physiologic race survey. Table 5 summarizes the reaction of some of these cultures. Oat selections C.I. 7637 and 7631 are thought to be new sources of resistance to at least one of the biotypes of race 6. Both selections were susceptible to races 6A, 7, 7A, 8, 8A, and 13A in the greenhouse at 65^{o}F. The response of C.I. 7637 and 7631 to rust culture #2 of race 6 (Table 5) is very similar to the response of R.L. 524.1 to this culture.

Table 5. Cultures of race 6 identified from field collections made in 1961.

Differential	Cultures of Race 6 [1/]					Race 13 tester
	1	2	3[2/]	4	5	
Andrew	S	S	S	S	S	S
Bonda	S	S	S	S	S	S
Jostrain	S	S	S	S	S	X
Rodney	R	R	R	S	S	R
C.I.4023	R	R	R	S	S	R
C.I.7438	R	R	S	S	S	R
C.I.3039	R	S	S	S	S	R
C.I.2413	R	S	S	S	S	R
C.I.6643	S	S	S	X?	S?	S
C.I.7637		R				S
C.I.7631		R				S

Table 5. Continued

C.I. 4023	Hajira x Joanette
C.I. 7438	Hajira x Banner R.L.524.1
C.I. 3039	Kherson
C.I. 2413	Unnamed
C.I. 6643	Clinton x Ark 674
C.I. 7637	Arlington 3x Wintok 2x Clinton[2] x Santa Fe 4x Florad
C.I. 7631	Woodgrain x Suregrain 3x Victorgrain[2] 2x Bond x Fulghum 4x Suregrain

1/ Cultures identified in greenhouse at temperatures of 70°F±.

2/ This culture of race 6 was used in testing the 1961 Uniform Yield Nurseries.

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Cultures of oat stem rust have been obtained by Dr. R. U. Cotter from selfing and crossing races of oat stem rust which are virulent on various stem resistant diploids and tetraploid oats. A race 13A which attacks the variety Saia was obtained from selfing a purified culture of race 6. A race 7 was obtained from crossing two varieties of rust that attack all known sources of resistance in the diploid and tetraploid species of oats. The virulence in the rust for these highly resistant "wild" species was obtained rather easily and without too much labor. The results indicate that the stem rust resistance of Saia and other non-cultivated species is subject to the same limitations as the resistance of varieties with genes A, BC, D, and f; namely, the rust fungus in the United States is now known to have the potential of producing races, subraces or biotypes which will attack these highly resistant oats. Also, the results suggest that virulence in the pathogen may be increased by hybridizations with related varieties of the fungus.

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*** World Oat Collection[1/] ***

by J. C. Craddock, USDA
Beltsville, Maryland

To provide plant breeders with a readily available source of diverse oat germplasm, viable seed stocks from all geographic areas, where oats are known to exist, are maintained by the World Collection of Small Grains. The largest known collection of oat varieties and selections (6800 entries) is maintained by the Cereals Branch, Crops Research Division, ARS, USDA. Seed stocks from the collection are usually available for immediate distribution to domestic and foreign plant breeders. However, some domestic selections, not yet released by the originating station for general distribution, are restricted to individuals cooperating with government experiment stations. During 1961, the World Collection of Oats distributed 51,000 (5-gram) samples - 30,000 domestic and 21,000 foreign.

1/ Presented at the National Oat Conference held at the University of Florida, Gainesville, Florida, January 23-25, 1962.

The inventory of the World Collection of Oats is subdivided as follows:

(1) Active Collection - approximately 4500 entries. This is the collection normally used to fill seed requests.

(2) Inactive Collection - approximately 2100 entries. This collection is composed of selections whose pedigrees are identical with one or more entries in the Active Collection. If the desired germ plasm is not found in the Active Collection, the Inactive Collection is made available for screening trials.

(3) Species Collection - approximately 200 entries.

(4) Bulk composite of the Active Collection - approximately 20 bushels.

(5) Panicles of the entries in the entire collection.

These are not available for distribution except in very special cases.

There are two categories of seed stocks in the Collection; namely, (1) introductions from foreign countries, identified by a P.I. number, and (2) domestic varieties and selections, identified by a C.I. number. The introductions are the primary source of new germplasm that is used in the domestic oat breeding program. Most of the germplasm used to develop improved varieties can be traced to one or more introductions.

Periodically, usually at 5-year intervals, the entire Active Oat Collection is grown at Aberdeen, Idaho, to replenish the working inventory of and to renew the viability of seed stocks. With the present storage facilities, it is hoped the nursery will only have to be grown at 10-year intervals to maintain the viability. Individual entries are grown as often as necessary to maintain sufficient seed stocks.

In addition to the seed stocks maintained at Beltsville, other complete sets of the Oat Collection are in storage at the National Seed Storage Laboratory, Fort Collins, Colorado; Iowa State University, Ames, Iowa; and Aberdeen Agricultural Experiment Station, Aberdeen, Idaho.

To keep any change in the populations to a minimum, the seed stocks used to seed the nurseries for approximately five times are taken from the same seed crop. This procedure helps to insure against any accumulation of off-types due to out-crossing and/or mechanical mixing that may occur each time the nursery is grown.

Except for mixture of genus or species, the introductions are not rogued or purified in any way unless they are definitely known to be samples from pure-lined seed stocks. Therefore, in order to get the most efficient use of the PI's, many of which were introduced as mixtures, testing should be on the individual plant basis. The named varieties, for which there is a standard description, are rogued and purified for trueness to type. When the nursery was grown at Aberdeen in 1960, all the named varieties were checked and rogued for purity. Seed of these varieties will be re-grown and checked for purity during 1963 and then this purified seed will be substituted for that currently in the Collection. The seed of the varieties that this purified seed replaces will then be added to the Inactive Collection.

Although all seed stocks distributed are sent at no cost to the individual receiving them, it is requested that a copy of whatever data is obtained be returned to the World Collection of Small Grains. In order to make this as easy as possible, two copies of the varietal list for each shipment of 100 or more entries, are provided. The data obtained is to be recorded on one copy of the varietal list and returned to the World Collection of Small Grains; the other copy is for the individual's file. When only a few entries are sent, the PI or CI numbers are written on the envelopes containing the seed.

It will help everyone if the data is returned as soon as possible and, in most cases, the data is returned promptly. As soon as sufficient data on any one subject is obtained, it is summarized and published as a Data Compilation. To date, there have been six data compilations prepared relating to oats. These compilations are distributed to individuals primarily interested in oats and to anyone else who may request them.

Along with maintaining viable seed stocks, filling and shipping seed requests, and summarizing data, several other projects involving the Oat Collection, are being undertaken by the World Collection of Small Grains. Briefly, these are as follows:

(1) Making an IBM index of all entries in the Collection. This initial listing will show the CI and PI numbers, name, origin of seed stocks, and pedigrees, if known.

(2) A uniform set of abbreviations for the named oat varieties.

(3) Compilation of data correlating kernel weight, kernel/panicle, and protein percentage.

(4) A streamlined collection composed of at least one or more entries from each of the geographic areas (where oats are known to grow). This collection would be used in preliminary trials. If the desired germ plasm was found, all entries from this area could be tested for additional germplasm. This may eliminate, in some cases, the need to screen the entire 6800 entries.

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*** Effects of Oat Mosaic ***

by G. M. Wright
Crop Research Division, D.S.I.R., New Zealand

Stunted plants have been observed in autumn-sown oats on the Crop Research Division farm for several seasons. It was shown some years ago that this condition was not produced by a seed-borne virus. In November 1960 Dr. J. K. Slykhuis observed a leaf mottling associated with the stunting, and suggested that the plants might be infected with a soil-borne virus similar to the apical mosaic virus which occurs in the Carolinas and Georgia. This has not yet been confirmed.

Varieties

Our small oat collection was not grown in the 1960-61 season, and in the current season mosaic infection is too slight to show differences in susceptibility between varieties.

In the small parent plots sown in 1960 there were seven American varieties. Brighton and Scotian showed moderate stunting and mottling, while Abegweit, Garry, and Sauk had severe stunting, with mottling recorded as slight, moderate, and severe respectively. Rodney had slight stunting and moderate mottling. There were no symptoms in Victoria, although the plot was next to the plot of Sauk, and was presumably exposed to infection. This does not agree with American observations.

Other varieties in which no symptoms were observed were Algerian, Algeribee, Avon, Gartons Forward, Picton, and S172.

In yield trials a more reliable assessment of resistance was possible, and some groups of hybrids showed wide segregation. Progenies from the cross of the moderately susceptible varieties Onward and Milford, for instance, varied from "very susceptible" to "resistant".

Effects on Yield and Quality

In one early-generation plot some plants were rosetted, and in some others stunting was very severe, but in the advanced lines surviving in the yield trials the disease did not appear to have affected yields. Parts of the plots of susceptible lines were stunted to a remarkably uniform degree, being about half the height of unaffected parts, and although the panicles were smaller there were more of them.

Samples of plants from two feet of row were taken from two affected and two normal parts of plots of seven hybrid lines in one yield trial. Five of the 28 sheaves were damaged by mice before threshing, and results were analysed by the method of fitting constants. The only character for which there was evidence of line differences in response to mosaic was the percentage of ears ripe at harvest.

Results were as follows:

	Mosaic	Healthy	t
Ears formed per foot of row	48	34	4.3**
Ears ripe at harvest, %	66	90	5.7***
Yield per ripe ear (gm)	1.83	2.73	5.7***
Total yield from ripe ears (gm)	56	84	4.5**
Millable oats, % (A6 screen)	61	49	3.7**
Kernel percentage in millable oats	72.8	72.9	0.1
Est. oatmeal yield (gm/ft. of row)	24.9	29.6	1.7

Some of the differences shown may have been a result of normal variation in "soil fertility", and not mosaic, as the comparisons are partly mixed up with replicate differences. However, it appears from the replicate differences in yield shown by the 20 resistant lines in the trial that the above yield differences are underestimated.

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*** World Germplasm Bank ***

by N. F. Jensen, Cornell University

A cooperative project to begin the accumulation of samples of world oat germplasm in the heterozygous state is ready to start. Only one kind of seed will be solicited; this is F2 seed produced on F1 plants. Any person working with hybrid material is invited to take part. As a cooperator you will be eligible to receive seed of the composite in a distribution which will begin as soon as the central stockpile reaches a sufficiently large amount. Even with modest participation, the seed of the composite will produce segregating populations derived from many countries. The diversity of the composite will increase yearly as new lots are added to the central stockpile. The following are given to answer questions on details:

1. How do I become a cooperator? By sending seed from your project.
2. What kind of seed should I send? One kind only: F2 seed, that which is produced on an F1 plant.
3. Are parentage or records needed? No. Neither the parentage nor the reason why you can spare the seed is important.
4. Must seed from different hybrids be sent separately? No. Mix all into one lot for shipping. Even though there may be differences in amounts of seed coming from different crosses, this is not likely to create any serious imbalance in the central composite.
5. What amounts of seed should I send? No restriction. It is believed that the limitation of seed produced on F1 plants will be a sufficient check on large lots of similar material; on the other hand small lots of even a few seeds are desired.

6. Suppose I am in doubt as to whether a particular lot is wanted for the composite? Send it anyway with a notation on tag.

7. What happens to my seed when received? It will be stored until a certain calendar date each year, at which time it and all other lots received by that date will be added to and thoroughly mixed with central stockpile.

8. Will the seed I send ever be grown as a separate lot traceable to me? No, all lots will enter a single master composite.

9. When can I expect to get some of the composite seed for planting? It may take a year or two for the stockpile to reach a size where distribution can be made. Thereafter, after an amount for the continuing stockpile has been set aside, distribution to cooperators will probably be annually and/or on request. You will be kept advised through the Newsletter.

10. When should I send seed? Now, if you have some surplus; otherwise whenever it becomes available.

11. Suppose I have no surplus seed to send? You may become a cooperator by hybridizing representative parents in your work, growing the F1's and sending the seed.

12. Are all the details of the bank's operations settled? No. It is hoped that an advisory committee will be established to iron out operating policy and details. What is needed now is your attention and cooperation so that the first step, accumulating seed, can be taken.

13. Where should I send seed? During the next year or so a permanent, central location and address will be chosen, but for the time being send seed to:

    Neal F. Jensen, Plant Breeding Department, Cornell University, Ithaca, N.Y. prepayment of postage will be appreciated.

In conclusion, I hope that you will realize that this project can be very useful to many peoples. It may be helpful when you contribute seed to think of it as a generous, altruistic approach to a cooperative project. I hope no one will refrain from contributing seed because of the chance that someone, after four or five generations of work, might select a line good enough for variety release. If this should happen, we can all take vicarious pleasure in the event. If, however, there is any serious concern on this point, it should be emphasized again that the person sending the seed is the sole judge of what is sent; we feel certain that seed from some of the "worst" hybrids will turn out to be for someone at sometime in the future, the "best" source of the genes he is looking for.

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*** A Program for the Conduct of Field Trials with Small Grains ***

by Robert P. Pfeifer, Pennsylvania State University

Variety and selection field plot testing requires a large expense of money, time, and effort in a small grains breeding program. Reducing this investment while improving the accuracy of the results is most desirable so that more time can be spent in other phases of research.

A plot seeder was designed and built to plant four (4) row plots 10 ft. long from one package of seed. Average planting rate is about 150 plots or 600 plot rows per hour. Use of the planter has streamlined many operations such as seed packaging, and boxing prior to planting. Field work such as marking plots to be planted was greatly reduced. The human error as well as the coefficient of variation of yield data were reduced.

Harvesting of plots was mechanized to a degree by use of a power mower fitted with baskets to catch the straw. Four men can cut and bind 200 plots of standing grain per hour. A modified Vogel thresher is equipped with sealed bearings. The only service for this machine is oil and fuel for the engine. There is no grease about the machine on which grain may cling.

Mechanization of field plot work is not an easy matter, because the machinery must be used by several people. It must operate safely, dependably, and accurately. The plot planter has been a most satisfactory addition to improve our technique as several have used it and continue to use it with good results.

An unfortunate condition arises from the mechanization of field plot work. Often data are not recorded because the experimenter realizes that there is not enough time for processing. Data processing may now be streamlined to the point that it is one of the lesser time consuming needs in the program.

Most computer systems available to plant breeders have not been adequate for his needs. However, computers with larger storage capacity and the capacity to accept alphabetic information have the potential to compute all the data as the experimenter desires, and read out the results in tabular form.

For the past three years, data have been processed in various stages of efficiency by computers. Now that a large computer is available we are just programming steps away from the computation system described above.

Some of the ways a punched card system streamlines field plot work are as follows: Field note books are made by printing the plot code at the left hand side of the note book page. Pages are assembled and bound on to a hard board back. Columns are ruled on the pages to accept the plot data. When the data are to be analyzed they are punched on cards as read from the plot books by the key punch operator.

Field plots and the grain from each plot are labeled with tags made from IBM cards. The card has all the code information on it required to permanently and completely identify the plot and its contents. The plot labels are fastened to wire stakes with star fasteners. When the plot is cut the label is bound with the grain. If harvest notes such as bundle weight are needed, these notes are written on the plot label and later they are copied into the field book when the grain is cleaned. When the grain is threshed, plot tags are transferred from the grain bundle and placed in the seed bag. The plot label now becomes the permanent label for the seed from the plot.

The IBM cards used for plot work have a special printed form. At the top of the card there are labeled spaces for coding information such as plot number, entry number, test number, location, year, rate, row, column replication, pedigree, etc. The remainder of the card is printed for mark sense (electric pencil) recording of data. The mark sense method of punching cards was too slow for our use, however, it may have use for those who wish to collect data and do not have a field book available.

As one becomes acquainted with use of electronic computers, he is duly impressed with the 100% perfection requirement necessary for their use. Since computers make very few mistakes, and good programs are designed to detect mistakes, one gains considerable respect for the reliability of the arithmetic computation of data. Use of field plot designs such as the square lattice, lattice square, factorial, and split-plot are practical, as computers handle these data nearly as fast as simple designs. Use of converted and computed variables becomes an effective tool with computer processing. For example, plot yields are read in grams, but are computed and read out as bushels per acre. For tons of straw per acre, the data read in are grams per plot and pounds of sheaf weight per plot.

A good field test program is one in which an experimenter is confident of the results, and is willing to predict the performance of the material tested. More often than not good results come from plots that appeal to the eye and are handled with precision methods. There is much art and skill demanded in a good field plot testing program.

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*** Policy Concerning the Availability of the World Collection of Small Grains Maintained by U.S.D.A. ***

by L. A. Tatum, Cereal Crops Research Branch, CR, ARS, USDA

Two years ago the National Wheat Improvement Committee invited this Branch to study the procedure that should be followed with respect to new entries in the C.I. collection. Since oats and barley would be equally affected, these crops were added to the study. The following five paragraphs outline the viewpoints we hold.

All items in the official list of varieties and accessions are "open stock," i.e., seed samples for breeding and research purposes are available to any bonafide breeder or investigator on request insofar as seed stocks permit. Generally not more than 5 grams will be supplied.

All Plant Introduction accessions (P.I.'s) are open stock as soon as quarantine restrictions are met and seed supplies can be processed from the detention sowings. It is specifically understood that seed made available from the P.I. and C.I. series will not be multiplied for commercial growing, or sale, or for any other type of release without the knowledge of the originating agency or agencies. Seed of some foreign stocks may be limited by patents held by the breeder.

Accessions in the C.I. series become open stock 5 years after date of assigning the C.I. number and become a part of the official list of World Collections at that time. However, since certain of these lines are breeders' selections in the course of development, the originating agency or breeder may redesignate as limited stock any of its own lines for an additional period of 3 years. Requests for seed of limited stocks should be directed to the originator. The 5-year waiting period may be waived by the originator. Varieties that have been officially named are open stock when they become available commercially.

Only those accessions that are open stock will be included in USDA World Collection units submitted for storage at the National Seed Storage Laboratory at Fort Collins, Colorado.

Nothing in this statement of policy is intended to alter the practice of free exchange among breeders engaged in cooperative investigations conducted under memorandum of understanding or comparable agreements or under A Statement of Responsibilities and Policies Relating to Seeds established by the Experiment Station Directors and ARS in 1954.

A tentative draft of these ideas was reviewed by the Northcentral Barley Conference, National Oat Conference, and two Regional Wheat Conferences. Several helpful suggestions were received from these groups and incorporated in the above statement. For the present, Dr. J. C. Craddock custodian of our collections, will follow the procedure outline above. Further suggestions from workers will be most welcome.

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*** Seed-Borne Fungi and Their Control ***

by W. F. Crosier, N.Y.S. Agr. Exper. Sta., Geneva, N.Y.

On the basis of samples, both certified and farmers' lots, examined during their germination in paper towels Alternaria tenuis continued to be the most prevalent seed-borne fungus of oats. This species rarely infected parts of the seedling other than the coleoptile sheath and root tips. As shown in Table 1 it was reduced or eliminated by the commercial seed treatments formulated from organic mercurials.

Alternaria tenuis was useful as an indicator organism in the macrobiologic assaying for fungicide on oat seeds. The presence of the fungus on more than 50 percent of the seeds in any sample was regarded as proof of no treatment. Microbiologic assays of oat seeds with Glomerella cingulata as the sensitive fungus have invariably confirmed the results of the macrobiologic tests.

Mycelia of Epicoccum spp. or pink mold fungi were observed on the majority of the untreated germinating samples The percentage of visibly infested samples and/or of discolored seeds per sample did not vary significantly between varieties or between years. The orange or pink hyphae of Epicoccum spp. were evident on a maximum of 12 percent of the seeds in any germinating sample. The black spore masses (sporodochia) were observed at 75X magnification on 25-65 percent of the seeds in the infected samples. Seed treatments, both mercurials and non-mercurials, controlled this fungus.

The scab organism, Fusarium roseum, infected seedlings in 79 percent of the untreated and in 55 percent of the treated samples of wheat seed of the 1961 crop. It was anticipated that oat seed produced in the same areas in 1961 would also carry F. roseum. Judging from some 300 lots recently tested, the scab fungus was absent from cleaned seed of Clinton, Clintland, Oneida and Tioga but was present in Garry and Rodney.

When 400 lots of uncleaned farmers' oats were germinated Fusarium poae or F. roseum vegetated in 5 percent of the Garry and Rodney, in 3 percent of the Oneida and in 10 percent of the samples of minor or nondescript varieties.

The inflorescences of every variety of oats inoculated with macerated mycelia of Fusarium spp. have produced 25 to 90 percent of infected seeds. Aggressive isolates of the graminearum type of F. roseum have been stored in the seeds of Anthony, Clinton, Garry, Mohawk, Oneida, Vicland and Victory oats. F. equiseti, F. moniliforme, F. oxysporum f. sp. pisi, and F. poae when inoculated into oat flowers have also become resident in the seeds.

The black stains caused by Septoria avenae indicated that the fungus had reached a few seeds in the majority of the lots examined. At least 55 percent of the seeds in 3 samples of Garry oats had been stained by S. avenae. On the basis of total seeds discolored the Oneida variety was markedly less susceptible than other varieties.

A total of 107 lots representing 7 varieties were examined for seed treatments. Only 2 of the lots were found to carry no fungicide. These were not claimed to be treated. Another 2 lots, however, which were represented as being treated, carried an adequate amount of fungicide. According to the label statements only 6 kinds of seed treatments had been used. No red dye was visible in 6 of the suscept treated samples but the presence of a fungicide was proven by microbiologic assays.

Overtreatment or improper distribution of the seed treatment was indicated in 22 samples by the presence of mercury-poisoned seedlings. The percentage of chemically-injured seedlings exceeded 2 percent in only 1 sample.

Table 1. Common Fungi Observed in Germinating Samples of Oats

Variety of seed	Seed treat-ed?	Percentages of samples carrying fungi										
		Alternaria tenuis			Epicoccum spp.			Fusarium	Septoria avenae			
		1-50	51-90	91-100	Tr	1-3	4-8	roseum	Tr	1-5	6-10	11-55
					1959 Crop							
Garry and Rodney	Yes	4	0	0	1	0	0	1	14	27	16	16
	No	10	9	81	4	31	24	3	--	--	--	--
Clinton and Clintland	Yes	4	0	0	0	0	0	0	8	15	17	0
Oneida	Yes	19	0	0	0	0	0	0	58	21	0	0
Other Varieties	Yes	14	0	0	0	0	0	2	8	22	28	3
	No	18	13	69	9	31	8	0	--	--	--	--
					1960 Crop							
Clinton and Clintland	Yes	6	0	0	0	0	0	0	17	30	13	5
	No	22	28	50	0	42	11	0	--	--	--	--
Garry and Rodney	Yes	6	0	0	2	0	0	2	7	45	15	26
	No	2	9	89	2	44	33	4	--	--	--	--
Oneida	Yes	2	0	0	2	0	0	0	29	31	8	16
	No	5	9	86	5	41	19	5	--	--	--	--
					1961 Crop							
Clinton and Clintland	Yes	4	0	0	3	0	0	0	12	24	12	28
	No	0	23	73	0	52	0	0	--	--	--	--
Garry and Rodney	Yes	3	0	0	2	0	0	2	12	19	23	31
	No	0	6	94	32	41	27	14	--	--	--	--
Oneida	Yes	3	0	0	3	0	0	0	16	22	6	5
	No	0	18	82	18	9	19	0	--	--	--	--
Farmers' Lots	No	14	27	56	6	35	9	5	13	26	26	8

*** Puerto Rico Oat Rust Nurseries, 1961-62 ***

by H. C. Murphy and Marie Prechtl, USDA

The presence of extremely virulent subraces of race 6 and other races of oat stem rust inColombia and certain other South American countries and the possible presence of these or similar subraces in North America emphasizes the importance of the Puerto Rico oat rust testing facilities. Until such virulent races of crown and stem rusts become widespread and firmly established in the United States in both the alternate-host-functioning areas of the North and in the overwintering areas of the South, it does not seem advisable to use them for inoculating in the field or for testing in the greenhouse where there is danger of escape.

Stem rust race 6A and crown rust races 264 and 321 were used to inoculate the 1961-62 oat nurseries grown at Mayaguez, Isabela, and Ponce, respectively. Race 6A was substituted for the related 13A, used in 1960-61, because it appears to be more prevalent and dangerous. Race 264 is the most widely virulent race of crown rust discovered to date. Although it has not shown any recent significant increase in prevalence and distribution, it appears to be widely distributed in the United States and is potentially the most dangerous of all crown rust races. Race 321 is a new race with limited distribution in the Great Lakes Region and eastern Canada. Since both Landhafer and Saia are susceptible to 321, it represents a serious threat to the many Saia and C.D. 3820 derivatives now being developed in various breeding programs.

M. D. Simons supplied the inoculum of crown rust races 264 and 321 for inoculating the Puerto Rico 1961-62 nurseries. G. J. Green and R.I.H. McKenzie, Canada Department of Agriculture, supplied the stem rust race 6A inoculum for the 1961-62 nursery at Mayaguez. Supplying adequate, viable and pure inoculum has been a major contribution to the success of the Puerto Rico oat rust nursery program.

Facilities for testing parental and early generation lines of oats with dangerous races of rust have been made available by the Federal Experiment Station, Crops Research Division, ARS, USDA, Mayaguez, Puerto Rico, and by Agricultural Experiment Substations of the University of Puerto Rico at Isabela and at Fortuna, near Ponce. Donald V. McVey, pathologist, and Felix A. Jimenez, agricultural aid, Federal Experiment Station. Mayaguez, are responsible for the Puerto Rico phases of the program. The over-all wheat and oat rust testing program in Puerto Rico is coordinated by Louis P. Reitz, Crops Research Division, Beltsville, Maryland. The oat nurseries are coordinated by H. C. Murphy. All seed is assembled and data summarized and distributed by Marie Prechtl and J. C. Craddock at Beltsville.

The number of cooperators submitting entries, states or provinces participating, and rows of oats grown in each nursery, for the past five seasons, have been as follows:

	1957-58	1958-59	1959-60	1960-61	1961-62
Cooperators participating	17	18	25	24	21
States and provinces represented	13	12	16	15	18
Approximate number of rows					
Crown rust race 216	--	600	--	--	--
Crown rust race 264	4,800	4,800	5,700	5,002	4,774
Crown rust race 290	--	1,200	5,000	--	--
Crown rust race 294	--	--	--	4,899	--
Crown rust race 321	--	--	--	--	2,964
Stem rust race 6A	--	--	--	--	2,238
Stem rust race 13A	--	540	1,900	547	--
Total	4,800	7,140	12,600	10,448	9,976

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*** Observations on Flowering and Seed Set in Oats Grown Outside their Area of Adaptation ***

by N. F. Jensen (Ithaca, N.Y.), A. D. Day and G. D. Massey (Tucson, Arizona)

A sequence of events involving oats of related germplasm which all produced seed set in winter increases in the southwestern U. S. so low as to constitute crop failure suggested the hypothesis that there may be oats with different kinds of flowering and seed setting characteristics, specifically, a determinate type and a non-determinate type. The latter type may be very productive in our northern area, but when moved south to a different daylength zone, this indeterminacy may become a real factor in production with long vegetative growth, excessive tillering and uneven ripening. Under these conditions the crop may also run the risk of hot weather and blasting in April or May. The oats were Garry, Garry selections and selections from hybrids with Garry parentage. Additional credence was given to this hypothesis as Garry has the reputation in New York of being an oat which ripens unevenly. Green tillers are often found in abundance in fields at normal fall harvest times. Preliminary experiments to test this idea, completed last winter, gave inconclusive results although the same phenomenon of low seed set was found. Because this does not happen with all northern varieties under these conditions, we are convinced that the phenomenon has a heritable base but may more likely be associated with interaction between genotype and daylength and temperature.

Unusual reponses of plants grown outside their normal area of adaptation has often been observed. In oats, reversals in the order of maturity among varieties have been noted, as well as gross changes in structure. For example, a medium height northern oat grew to a height of more than eight feet during the winter near El Centro, California.

Information on fold increases (ratio harvested to planted) from seed planted for winter increases in southwestern U. S., obtained from several people, show this general pattern: 21, 44, 79, 113, 141, 165, 167, 191, 210, and 213. The Cornell increases show two successes: A Goldwin x Clinton selection, 58 fold; and Oneida from a Goldwin x Victoria-Rainbow cross, about 75 fold. The low seed set cases all involved Garry or Garry parentage and the fold figures are deceptive because the harvested seed was light, bulky and chaffy with relatively few groats in proportion to hulls. Fold figures are not available from a 1950 increase of a Garry selection but the increase was disappointing and similar in pattern to a 1954 Garry increase yielding 17 fold and a 1959 Tioga increase yielding 26 fold. The Tioga crop before maturity was estimated at 3000 pounds; actual yield was 1120 pounds from which 420 pounds of light seed was salvaged. On the same farm another variety yielded above 100 bushels per acre.

To test this idea a group of 18 oats were planted for observation in single plots 16' x 3 rows, at Yuma, Arizona on December 7, 1960 under irrigated conditions. Data collected on these oats are given in the following table:

	Heading Dates			Yield	
Variety	Began	Ended	Duration	1 row gms	
Ajax	4/15	4/26	11	133	
Clintland	4/4	4/17	13	49	
Craig	5/17	5/6	19	62	
Garry	4/17	5/3	16	45	
Goodfield	3/30	4/12	12	60	
Mohawk	4/4	4/15	11	28	
Oneida	4/24	5/15	21	72	
Rodney	4/17	5/8	21	25	
Tioga	4/20	5/8	18	18	Parentage 50% Garry Sel. 5
Niagara	4/26	5/17	21	38	Parentage 50% Garry Sel. 5
5271-5	4/20	5/8	18	100	Craig x Alamo
5271-22	4/15	5/3	18	162	Craig x Alamo
5271-51	4/24	5/10	16	176	Craig x Alamo
5279-14	4/15	5/1	16	190	Parentage 25% Garry Sel. 5
5279-37	4/10	4/26	16	207	Parentage 25% Garry Sel. 5
5279-70	4/12	5/3	21	237	Parentage 25% Garry Sel. 5
Goldwin	4/24	5/15	21	31	
611B-15	4/15	5/6	21	38	Goldwin x Clinton

Sterility of lower florets was noted on all oats except Niagara. All plots were harvested on May 5, 1961. Comparative yields of Palestine oats were 519 grams and Markton 135 grams.

Although Tioga again produced the lowest yield there was no evidence of a prolonged fruiting period in it or other Garry or Garry-derived oats, such as had been observed in other years. The selections from 5271 and 5279 which gave high yields all have 50% Alamo parentage. A test of this kind, although inconclusive for the points under consideration, might be useful a year in advance of a contemplated winter seed increase.

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IV. CONTRIBUTIONS FROM OTHER COUNTRIES

*** CANADA ***

by F. J. Zillinsky, R. V. Clark and P. Dyck
(Central Experimental Farm, Ottawa)

Almost ideal weather conditions during May and June produced a luxuriant growth of oat crops in Ontario. July however brought with it severe rain storms which lodged even the strongest strawed varieties in most areas of the province. This environment was apparently favorable for Septoria and saprophitic organism and damage to foliage and grain was particularly severe in the lodged areas. Yield test plots at Ottawa were completely ruined.

Reports on the performance of Russell oats in Ontario are quite favorable. In spite of the unfavorable weather in 1961 this variety outyielded other varieties in yield trials as it had in previous years. Although there is a relatively good supply of seed in Ontario, the seed trade reports an unpredicted demand for this variety.

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Department of Agriculture Research Station, Winnipeg, Manitoba

by G. J. Green, R. I. H. McKenzie, and D. J. Samborski

The growing season in 1961 on the Canadian prairies was one of the driest and warmest on record at many locations. Only in central and northern Alberta did adequate rain fall and as a consequence yields in Alberta were near normal. However, in Saskatchewan yields were only one-third of normal while in Manitoba about half a normal crop was harvested. Compared to the average of about 300 million bushels of oats harvested in recent years only 186 million bushels were harvested in the Prairie Provinces in 1961.

The dry weather that reduced yields also reduced the prevalence of rust in Western Canada in 1961. Oat stem rust, which usually appears in Manitoba early in July, was not found until August 1. Infections were scarce on all varieties including susceptible wild oats and only seven collections of stem rust were obtained from Western Canada. Crown rust was scarcer than stem rust. It was found only three times in southern Manitoba; the first collection was made on August 9 in the Red River Valley when harvesting was under way.

The scarcity of rust rendered the physiologic race survey of Western Canada inadequate but a change in the distribution of stem rust races was evident. Four of the seven isolates were race 6 which has been uncommon in the Prairie Provinces. The four cultures are interesting because they are virulent on varieties carrying gene F which confers resistance to races 6A, 8A, and 13A. The race 6 from Eastern Canada is avirulent on varieties carrying gene F. The race distribution in eastern Canada has not changed significantly in the past three years. Races 6A and 13A predominated.

Ninety cultures of crown rust were isolated from collections made in Eastern Canada. Nineteen of these isolates comprising five races attacked Victoria, twelve isolates comprising 6 races attacked Saia, and nine isolates of 2 races attacked Landhafer. Nearly all isolates, regardless of race, attacked Garry and Rodney.

Two new races of stem rust were isolated from barberry infected in the greenhouse by means of teliospores produced in the field at St. Anne de la Pocatiere, Quebec. Cultures of races 6A and 8A were isolated that can attack varieties carrying gene F, including R.L. 524.1 and C.I. 4023. These two varieties are resistant to all cultures of races 6A, 8A, and 13A established from uredial collections. Apparently some of the races occurring in Eastern Canada are heterozygous for virulence on gene F. Consequently, the appearance of races virulent on varieties such as R.L. 524.1 and C.I. 4023 in barberry areas can be anticipated if and when varieties with the same or similar types of resistance are widely grown.

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Department of Plant Science, University of Manitoba, Winnipeg

by R. C. McGinnis

Aneuploids in Garry

An attempt is being made to produce an aneuploid series in Garry by obtaining natural occurring aneuploids in the foundation lines. Thus far about 4,000 seedlings have been analysed by root-tip chromosome counts. Of these, 24 were found to be aneuploids, a frequency of 0.6%. Monosomics have predominated but trisomics and nullisomics are also present. Deficiencies for the shorter chromosomes of the complement seem to appear most frequently although at least five different monosomics have been isolated. Certain monosomics have proven to be self-sterile. The trisomics generally are more vigorous and quite fertile. At least three different trisomics have been found. From this preliminary work, it would appear that a trisomic series might be built up and maintained more easily than a monosomic series.

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*** JAPAN ***

*** Hokkaido National Agricultural Experiment Station ***

by Takeshi Kumagai and Seiji Tabata

Oats were produced in yield of 32.3 kg per 10 are in performance test in 1961. This is a decrease of 3.5 kg per 10 are below the average yield of the previous nine years. Owing to dry weather in early summer and wet weather in harvest time, which caused a severe lodging with an additional heavy storm late in July, yields and grain qualities were lowered.

Crown rust was almost non-existent in most parts of Hokkaido till late in June but many dwarf plants infected with barley yellow dwarf virus were often found in the winter oats originated from the U.S.A. The disease finds agriculturists especially anxious about possible occurrence in Hokkaido in the future. Severe damage was also caused by manganese deficiency in parts of the station nursery late in May.

The continuous program for incorporating stiff straw into agronomically desirable types with high yield and earliness, was mainly put in practice by use of bulk or pedigree method. Lodging resistance of breeding materials was tested in treatment plots supplied with high quantity of fertilizer and seeded more densely than average. In the tests thirty-three lines with high yield and agronomically desirable characters were selected. These lines are originated from the following crosses; Milage X Pellelbo, Engelbrect X Victory No. 1, Kyto X Pellelbo, Tech X Pellelbo, [Zenshin X Shirokataho (White Tartar)] X Victory No. 1, Honami X Zenshin, Shirokataho (White Tartar) X Victory No. 1.

The crossing program has been carried on by the procedure of combining back cross with convergent cross in order to transfer valuable genes to the remote varieties taken from very different geographical areas into a well adapted type, recurrent parents. Oat crossing has been a difficult task. Workers in this station have obtained an average seed set of 50 per cent or better by increasing humidity during crossing period in greenhouse as well as by using fresh pollen grains within 30 minutes after dehiscence of pollen sacs.

The performance tests with regard to foreign varieties from different sources are being continued. Strubes Gelb II, a German variety and Fleur de nord, a French variety, were tested not only in the station nursery but also in various places in Hokkaido. Both varieties are early and stiff strawed with high yield and superior seed quality, showing a comparatively low hull percentage. Their characters may be like those of our leading varieties, such as Zenshin or Victory No. 1.

Oat seeds of R_2 irradiated by γ-ray from ^{60}Co source were successively tested by measuring the following yield components, viz., culm length, panicle length, panicle number spikelet number and grain weight. The variation in culm length and the rate of plants which combined short culm with abundant spikelets per panicle are shown as follows:

Varieties	γ - ray dose (Kr)	Culm Length Average (cm)	Variance	Rate of desirable* plant
Victory No. 1	0	106	40.71	3.6
"	10	111	65.31	4.0
"	20	111	64.41	4.3
Zenshin	0	94	26.03	8.3
"	10	97	39.50	11.7
"	20	93	37.53	18.0

* Showing the proportion of the following plants per 100 plants: plant numbers with short culm below 104 cm and abundant spikelets over 55 in Victory No. 1. Plant numbers with short culm below 94 cm and spikelets over 55 in Zenshin.

It is clear that the variations of characters influenced by irradiation show a varietal difference: Zenshin is lower than Victory No. 1 with respect to culm length but is rather higher than the latter variety with regard to the rate of desirable plants.

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*** GREAT BRITAIN ***

Manod (S.235) Spring Oats

by J. D. Hayes, Welsh Plant Breeding Station, Aberystwyth

A new variety of spring oats, Manod (S.235) having a high degree of resistance to stem-eelworm (*Ditylenchus dipsaci*), mildew (*Erysiphe graminis avenae*) and crown rust (*Puccinia coronata*), has recently been released by the Welsh Plant Breeding Station. Manod (S.235) is of composite origin developed from a cross of Tama, and a Station selection 01750/11 which was derived from convergent crosses of mildew resistant forms of *Avena byzantina* from North Africa, and various commercial varieties. Adapted for growing in England and Wales, Manod under disease-free conditions is similar to Sun II in general yielding capacity and date of maturity, but under conditions where mildew, crown rust or stem eelworm attack occur, it has shown a decided superiority over established varieties in yielding ability and lodging resistance.

The new variety has grain of good quality, with a medium-size grain of white to creamy-white colour. Even in areas where European-bred spring oats do not perform satisfactorily, Manod should prove a valuable source of resistance to the three diseases mentioned above. Seed of this variety has been forwarded to the World Collection of Oats at Beltsville, and has been assigned number P.I. No. 279043 and C.I. No. 7770.

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V. CONTRIBUTIONS FROM THE UNITED STATES: USDA AND STATES

*** ARKANSAS ***

by R. L. Thurman and J. P. Jones (Fayetteville)

Several of the stations have received seed of the stiff-strawed lines (the seed supply is about exhausted at present). The use of the material has been handicapped because of the plant height involved. A short strawed line C.I. 7782 has been developed which should prove to be of value in transferring the character from the tall breeding materials. C.I. 7782 is entered in the Uniform Central area Oat Nursery this year. It is resistant to H.V. blight and crown rust races 203, 216, 290, 298 and heterozygous to 264. The latter is believed to be a result of transgressive segregation of Landhafer and Trispernia resistance. C.I. 7782 is, however, late in maturity. A sister line 3-68 has a somewhat better average grain yield than C.I. 7782, but is taller and lacks resistance to race 264.

A necrotic type resistance to race 264 has been observed in breeding line 2-151, but, unfortunately, appears to be linked with susceptibility to H.V. blight. BL 2-151 is a sister line to C.I. 7783 which is also entered in the Uniform Central Area Oat Nursery. C.I. 7783 is susceptible to race 264 but appears to possess resistance to races 203, 216, 290 and 298, and also H.V. blight.

C.I. 7782, C.I. 7783, Line 3-68 and Victorgrain have a two year average grain yield of 94, 102, 119 and 98 bushels per acre respectively at Stuttgart.

A localized epidemic of crown rust occurred in the fall of 1960 in the Hope area and the prevailing race was identified as 290. Crown rust collections made in the spring of 1961 from the Uniform Rust Nursery at Stuttgart were identified by Dr. Simons as races 203 (one isolate), 290 (one isolate), 216 (six isolates), and 264 (two isolates). Identifications from the nursery at Fayetteville were races 202 (one isolate), 203 (four isolates), 211 (one isolate) 216 (five isolates) and 326 (one isolate).

A heavy crown rust epidemic covered the north western and central western sections of the state in the fall of 1961. The prevailing varieties Arkwin, Taggart and Victorgrain were heavily infected. All of the entries in the Uniform Northern Winter Oat Nursery at Fayetteville appeared to possess susceptible plants. Preliminary identifications indicate the prevailing races are of the Victoria attacking type.

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*** FLORIDA ***

by Dale Sechler and W. H. Chapman (Quincy)

Florida's oat acreage was down in 1960-61. Two big factors contributed to this reduced acreage - (1) a dry fall which interfered with early seeding and (2) increased interest in rye to satisfy winter grazing needs. Early season oat grazing was limited but grain yields were about normal with an average yield of 32 bushels per acre reported by the Florida State Marketing Bureau.

Crown rust was prevalent in 1960-61, especially race 216 which came in early and severely damaged susceptible varieties. Some varieties, such as Moregrain, resisted attack early in the season but were heavily rusted by race 276 which came in late. Dr. M. D. Simons identified races 213, 216, 276, and 295 from collections made in fields across North Florida. Race 264 was not found in 1961. No stem rust was observed during the season.

The new culm disorder, mentioned in the 1960 Newsletter and thought due to a Helminthosporium, was serious in 1961. Many experimental lines were susceptible to the disease. Varieties differ in their reaction to the disease but most varieties grown commercially in North Florida appear highly tolerant. No serious damage was observed in fields over the state.

In the breeding program at the North Florida Station great emphasis is being given to forage aspects of the oat crop. Characteristics thought desirable and being emphasized, in addition to those desired in a variety for grain production, are seedling vigor, high tillering capacity, rapid recovery after clipping, and growth at low temperatures. Cultural practices that might contribute to greater forage production are being investigated.

An evaluation of the forage potential of several diploid and tetraploid oat selections was made in 1960-61. Several of these appear promising from the standpoint of forage production, cold tolerance, and disease resistance. Some breeding work on diploid oats has been started in an attempt to improve straw strength and grain quality especially.

The oat acreage in Florida will be down again in 1961-62. The seeding of most oats was delayed until December by the driest fall on record. Record low temperatures in late December and January have caused an unusual amount of cold damage and plants have made very little growth.

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*** GEORGIA ***

by U. R. Gore (Experiment)

The acreage of oats harvested for grain in Georgia continues to decline, but total acres planted for forage holds about the same.

Year	Total acres oats planted	Acres harvested for grain	Yield grain bu. per acre
1960	424,000	196,000	35
1961	390,000	176,000	43

Major emphasis in oat breeding at Experiment is on developing forage and silage type oats with resistance to crown rust and _H. victoriae_. The completion of a new greenhouse (1960) and growth room (1961) will be a great help in the breeding program.

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*** IDAHO ***

by Harland Stevens, Frank C. Petr, and Ralph M. Hayes (Aberdeen)

The 1961 oat crop in Idaho was about four percent below the 1960 average. Northern Idaho and irrigated areas with sufficient water in southern Idaho reported good yields. Hot temperatures coupled with lack of adequate moisture decreased yields in several areas. Yields and test weight were above average in the Aberdeen area. There appeared to be no yield losses from diseases or insects. Aphids associated with yellow dwarf were not present in appreciable numbers until late in the season. A natural infection of race 8 of stem rust occurred late in the season on late-planted susceptible material at Aberdeen.

The research program at Aberdeen has been greatly enhanced with the addition of a greenhouse completed late in 1960. As before, the major emphasis in the oat breeding program is on increased yields and straw strength, however, more work is getting underway on improving quality. Protein content, groat percentage, seed size and test weight are being considered in choosing parental material and in making selections. Some progress has been made in selecting for larger seed size. More testing is required to determine if yield is adversely affected by selection pressure for large seed. Although oat diseases are not usually a serious problem in Idaho, resistance to stem rust and to smut is being incorporated in potential new varieties. An attempt is also being made to improve yellow dwarf resistance in our breeding program.

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*** ILLINOIS ***

by C. M. Brown and Henry Jedlinski (Urbana)

Oats produced a state average yield of 56 bushels per acre in 1961. This equals the previous record high yield of 1955 and is 5 bushels higher than the 1960 crop. It is interesting to note that the three highest average state yields on record have occurred within the past seven years, 1955, 1958 and 1961. Planting of the 1961 crop was delayed some by adverse weather, but a cool growing season with diseases at a minimum favored the growth and development of the crop with corresponding good yields.

The four leading varieties in acreage, as in 1960, were Newton, Clintland, Nemaha and Minhafer. The percentage acreage of several varieties in Illinois during the past 5 years is as follows:

Variety	Percent of Total Acreage Planted				
	1957	1958	1959	1960	1961
Bonham	3	2	3	3	3
Clintland	18	36	45	25	18
Clintland 60	--	--	--	--	3
Clinton	35	7	4	3	2
Goodfield	--	--	--	--	4
Minhafer	--	1	3	9	9
Nemaha	20	24	15	12	10
Newton	3	16	19	39	42
Shield	--	--	--	--	1

The Disease Situation

During the growing season of 1961 the occurrence of barley yellow dwarf virus (BYDV) disease of oats in Illinois was only of sporadic nature. Although a regular survey was not made, general observations indicated its presence in every location where oats were grown. In most cases it was limited, however, to the margins and scattered circular patches in the fields. Bird-cherry oat aphids, English grain aphids, greenbugs and corn leaf aphids were very commonly observed on small grains in relatively small numbers.

The weather conditions in the fall of 1961 were favorable for symptom expression of BYDV infection. The fall infected Dubois and Wintok oats in the experimental field plots exhibited for the first time typical symptoms at Urbana, Illinois. A special survey of the southern part of the state conducted in late November and early December indicated several fields of winter oats and barley to be heavily infected with BYDV. The four above mentioned sp. of aphids were present in high numbers. The virus was recovered from the suspected plants under greenhouse conditions with *Rhopalosiphum padi*. This is suggestive that winter cereals may serve as a potential BYDV reservoir for the north-central region.

Of special interest was the occurrence of downy mildew on oats in the central part of the state. Proliferations of stems, and production of shoots from the flowers in general similar to the damage caused by growth regulating compounds were associated with a Phycomycetous fungus resembling very closely in morphology Scleropthora macrospora described by Ullstrup and Whitehead. The disease was confined to only a few fields that had been flooded in the early part of the growing season.

Other oat diseases, although present in the state, did not present a major threat to the crop production.

Breeding for Resistance to BYDV

Backcrossing to transfer the BYDV tolerance of Albion to the varieties Minhafer, C.I. 7451 (Clintland type) and Goodfield has been continued. Five backcrosses using Minhafer as recurrent parent have been made. Several of the backcross lines that appear to have the BYDV tolerance of Albion were increased in the greenhouse in the fall of 1961. Sufficient seed of these is now available for testing and for further increases in the field. Should these lines perform comparably to Minhafer, some of them will most likely be bulked and ultimately released as a Minhafer type with BYDV tolerance.

Likewise, as many as 5 backcrosses have been made using Clintland type as recurrent parent. Unfortunately, none of the long time backcrosses using Clintland type appear to be as tolerant as Albion. However, many of them exhibited some tolerance, probably equal to Newton, in the Illinois test. Several of these lines have been increased in the greenhouse and will be tested in the field in 1962. Several progenies that had been backcrossed to Clintland type for only 3 times appeared to have the BYDV tolerance of Albion in field tests in 1961. Additional backcrosses have been made on to these lines for the purpose of transferring the total tolerance of Albion to a Clintland type.

Four backcrosses have now been made using Goodfield as the recurrent parent in crosses with Albion. Dodge, a more crown rust resistant sister selection to Goodfield, has also been used in some of the backcrosses. At present, it appears certain that it will be possible to transfer BYDV tolerance of Albion to the Goodfield type.

Work is now under way and appears to be progressing satisfactorily to combine resistance to the Landhafer attacking races of crown rust with BYDV tolerance.

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*** INDIANA ***

by F. L. Patterson, J. F. Schafer, R. M. Caldwell, L. E. Compton (Breeding, Pathology, Genetics), H. F. Hodges, R. R. Mulvey and I. D. Teare (Varietal testing).
K. E. Beeson, M. L. Swearingin (Extension), P. Bhamonchant, S. K. Gilbert, H. N. Lafever, D. E. Zimmer (Graduate Students).

The 1961 Season

Dry, late March permitted early seeding, but freezing weather with snow in mid-April allowed little or no tillering. May and June were cooler than normal. The state average yield was 44 bu/A in 1961 compared to 59 in 1960; the difference apparently due largely to the less favorable weather conditions.

Diseases were generally inconspicuous and caused little loss. Bacterial blight, however, was prominent on early oats in May as observed in previous cool seasons.

1961 Indiana Oat Production

(Data from the Purdue Dept. of Agricultural Statistics)

The state oat acreage continued the drop begun about 1957 in the face of feed grain surpluses and the competition particularly from soybeans. This is in spite of the record high yields of the 1960 season. The 1961 acreage was the lowest since 1877, and the production the lowest since 1939. Data for the last 5 years are as follows:

	Acreage Harvested (000)	Acre Yield Bu/A	Production (000) Bu
1957	1,025	34.0	34,850
1958	943	51.0	48,093
1959	877	38.0	33,326
1960	807	59.0	47,613
1961	605	44.0	26,620

Oat Varieties Grown In Indiana

The Purdue Dept. of Agricultural Statistics again reported the distribution of varieties in Indiana in 1961.

	Percent of State Oat Acreage	
	1959	1961
Clintland	53.8	30.6
Clintland 60	--	12.6
Clinton 59	14.7	16.8
Newton	18.2	19.5
Bentland	5.0	3.5

	Percent of State Oat Acreage 1959	1961
Minhafer	1.3	4.5
Putnam	2.0	3.2
Putnam 61	--	2.2
Goodfield	--	2.5
Dubois (Winter)	2.4	2.1
Other and Unknown	2.6	2.5

It is of interest to note that the Clinton-type varieties, Clinton 59, Clintland, and Clintland 60, as a group have so far remained quite stable in total acreage percentage since the survey was begun in 1957. These percents are (1957) 71.7, (1958) 69.3, (1959) 68.5, and (1961) 60.0. This is in spite of extreme yellow dwarf virus susceptibility and the presence of several other very good varieties, particularly those with higher test weight.

Oat Varieties Certified in Indiana in 1961

A total of 6,352 acres of oats was certified by the Indiana Crop Improvement Association.

	No. of Years Certified	Foundation Acres	Registered Acres	Certified Acres
Clintland	8			26
Clintland 60	3	16	409	1102
Goodfield	2	40	1808	
Minhafer	4		5	5
Newton	6	10	268	64
Putnam	5		137	
Putnam 61	1	95	1357	
Dubois (Winter)	9		194	
Norline (Winter)	2	37	639	15

Spring varieties recommended for seeding in Indiana in 1962 are Clintland 60, Goodfield, Newton, and Putnam 61; and the winter oats are Norline and Dubois.

Tolerance to Crown Rust

In M.S. thesis research of M.A.J. Miah, Benton showed a significant degree of tolerance to crown rust infection as compared with the Clinton 59 variety under an equally severe rust infection. Tolerance was expressed in lesser losses of both grain and straw in the greenhouse.

Heavy crown rust infection of leaf blades of Clinton 59 caused early chlorosis and death of uninfected sheath and peduncle tissue of the same culm. Benton, the tolerant variety, showed a much later chlorosis and death of these tissues.

Mutations for Virulence in Puccinia Coronata

D. E. Zimmer studied mutations in the crown rust organism in Ph.D. thesis research.

Separate inoculations were made on 5 resistant oat varieties with urediospores from a monosporus clone each of races 202 and 290 in the fifth to ninth generations. Rare pustules occurred on 2 varieties. Ascencao and Ukraine screened variants from race 202; only Ukraine screened variants from race 290.

Variant cultures were tested for pathogenicity on 25 varieties. Cultures from Ukraine derived from 290, differed among themselves in other pathogenic characters, suggesting a mechanism producing more than one change in pathogenicity.

All variants appear most likely due to mutation. The mutation rate for race 202 for virulence on Asencao was estimated at 1 in 2,200 infections; that for virulence on Ukraine, 1 in 6,450; and that of race 290 on Ukraine, 1 in 7,900.

"Milford" Panicle Type and Straw Strength

Relation of panicle type and straw strength was studied by P. Bhamonchant in Ph.D. thesis research. Six lines of spring oats differing in panicle type and straw strength were studied in 12 hybrids. The dense panicle type of Milford was controlled by a recessive factor pair with a modifier present in some crosses.

The association of panicle type and straw strength was high in 2 years (r = 60). Dense head type was as good a selection index for straw strength as was any one or combination of 8 morphological characters studied. These included: plant height, length of internodes, diameter of second internode from the panicle, diameter of lowest internodes, diameter of culm at base of panicle, length of flag leaf sheath, and length of peduncle exertion.

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*** IOWA ***

Identification of Monosomes

by T. D. Chang[1] and K. Sadanaga (Ames)

Identification of five monosomes produced in the variety Cherokee by X-irradiation has been carried out. Identification was based on breeding behavior (frequency) of nullisomes from self-pollinated monosmes), centromere location and size of univalents as determined from pollen mother cells at metaphase I and anaphase I, morphology of plants, and crosses to mutants.

[1]Graduate student.

Monosomes A and B are different. Mono-A can be distinguished by its very small univalent with a subterminal centromere and fertility of 30% - 50%. Mono-B has its univalent associated with the gene for necrotic leaf, a chlorophyll mutation. Mono-C can be distinguished from the other monosomes by its relatively high frequency of nullisomes (8.7%) when selfed. Nullisomes were not observed in progeny of selfed mono-A, mono-B, mono-D, and mono-E. Mono-D has leaf margins showing abaxial curling. Other features include a more spreading growth, shorter height than other monosomes at the seedling stage, and heading date two or three days later than Cherokee. Mono-E shows no similarity to A, B, C, and D.

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*** KANSAS ***

by E. G. Heyne, Charles Sing, C. O. Johnston,
Lewis Browder, E. D. Hansing, Wayne L. Fowler,
and Webster Sill, Jr. (Manhattan)

Oat production for the state in 1961 was estimated at 16,698,000 bushels. Although the acreage harvested, 506,000 acres, was twenty percent larger than the 1960 crop, it was the second smallest since 1882. Yield per acre was estimated at 33 bushels, the second highest yield in the past fifty years.

Oat performance trials in 1961 continue to show that Mo. 0-205 is still among the best varieties for Kansas. Of the new experimental lines studied only CI 7448 appeared to equal Mo. 0-205. This selection is the result of a complex cross backcrossed to Mo. 0-205.

This season, for the first time, a number of plants were transplanted to the field. The progeny of plants were grown in flats in the greenhouse and inoculated with crown rust. The resistant plants were transplanted into 1 1/2" plant bands and later set in the field. This procedure worked reasonably well but under average conditions would have been more successful. Because of wet, cold weather at the proper time of transplanting the plants grew larger than desired. This system will be useful, especially when a reaction to a special race of rust is desired. Later in the field, a response can be obtained to either a natural infection or an artificially induced field infection.

The spotted occurrence of BYDV in 1961 emphasized the value of resistance germplasm, especially in the Kansas adapted selections of Richland x Fulghum selections. Some crosses were obtained in 1961 between the Richland x Fulghum and good sources of crown rust.

Less emphasis is being placed on breeding spring oats. Winter oat bulks have been grown in Kansas since 1951. Nearly all the material was winter killed in 1960, however, a few plants survived. Plant rows of the surviving plants appeared promising in 1961 in that some were earlier than Wintok and also had better grain quality. They lack in disease resistance and straw strength but appear equal or better than the winter oat-types now available for the extreme southeastern and southern part of the state.

In checking the records of Kanota oats the past several years little progress can be reported for yield of the newer varieties over the old Fulghum types. However, the rust susceptibility and weak straw of Kanota make it unsuitable for farm production. This comment is added to point out that there is no longer any typical "red" oats as was characterized by Fulghum, Kanota, and Columbia. It is still evident that these types have some properties of adaptation not found in varieties that have replaced them.

Several hundred selections of irradiated Mo. 0-205 from the studies of Caldecott and Stevens were grown in 1961. Only a few appeared promising enough from the agronomic standpoint for further study. Those retained were very similar to Mo. 0-205.

The acreage of oats approved for certified seed production in Kansas declined slightly in 1961. There were 333 acres approved in 1961 and 348 acres in 1960. Minhafer was the most popular variety for certification and Andrew was second. Varieties recommended in Kansas are Mo. 0-205, Andrew, Minhafer and Nemaha.

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*** MICHIGAN ***

by John E. Grafius and A. H. Ellingboe (East Lansing)

There are no new releases from Michigan for 1962. It is hoped that by 1963 some of the material now in the Uniform Early Oat Nursery derived from crosses by (Beaver-Garry x Clinton) Clintland by Minor and by Marne may prove suitable for increase. This material combines high yield, lodging resistance, and high test weight with tolerance to barley yellow dwarf and Septoria. As would be expected from the pedigree these lines do not have resistance to the newer races of leaf and stem rust.

The program continues to carry a strong emphasis on the solution of plant breeding problems. The most recent attempts have been to develop a selection index which can be used for many seasons and many populations, and to develop a more precise weighting procedure to be used in the vector method for the choice of parents. This information was presented at the National Oat Conference and a summary is given in the News Letter.

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*** MINNESOTA ***

by W. M. Myers, R. E. Anderson,
M. B. Moore, and B. J. Roberts (St. Paul)

Dr. F.K.S. Koo, who had been associated with the oat project since 1952, moved to Puerto Rico in June 1961. He is now a geneticist at the Federal Experiment Station, Mayaguez, P.R. Since last June, Rolan Anderson, formerly a research assistant with the corn project, has been a full-time research fellow on the oat project.

The acreage of oats harvested in Minnesota continued to decrease in 1961. Although yields averaged 46.0 bushels per acre, total production declined 16 percent from last year. In a 1960 survey by the State-Federal Crop and Livestock Reporting Service, the varieties currently grown in Minnesota are:

Variety	Percent of acreage	Variety	Percent of acreage
Rodney	47	Branch	3
Minhafer	14	Andrew	2
Garry	12	Sauk	1
Ajax	5	Cherokee	1
Burnett	4	Others	8
Minton	3		100

Some lines possessing adult plant resistance to crown rust obtained from P.I. 174544 were in preliminary rod-row yield trials in 1961. Generally, they were tall and late with a tendency to lodge, and yielded no more than the check varieties.

Genetic variability studies were conducted by Miss Suva Ghose for her M.S. thesis. Genetic variances were estimated in F_4, F_5 and F_6 generations of three lines (selections from Landhafer 3x Mindo 2x Hajira x Joanette 4x Andrew) crossed with Garry during 1961 at St. Paul. Approximately 25 F_2 families were evaluated in each population with 2 progeny per family per generation. Genetic variance among and within F_2 families was partitioned into additive and non-additive components for days to heading, plant height, panicle length and number of panicles. Estimates of heritability based upon additive genetic variance and expected genetic improvement resulting from selection were consistent with results obtained in the F_2 and F_3 generations. Estimates of additive genetic variance were relatively high for days to heading, intermediate for panicle length and very low for number of panicles. Non-additive genetic variance estimates were virtually zero for days to heading, relatively high for number of panicles and inconsistent for both plant height and panicle length. The results indicate (1) selection in advanced generations for number of panicles would be rather ineffective in these populations, (2) selection for increased plant height and panicle length would be more effective in later generations, and (3) selection for days to heading would be just as effective in early as in later generations.

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Physiologic Races of *Puccinia graminis* var. *avenae* in the United States in 1961

by D. M. Stewart, Cooperative Rust Laboratory, (St. Paul)

Race 6 became the most prevalent race in the United States for the first time in 1961. This race, together with the closely related race 13, comprised 59 percent of the isolates identified. Both races attack varieties with the White Tartar and Richland types of stem rust resistance and are generally virulent on most commercial varieties at high temperatures. They were found in 17 of the 19 States sampled in the survey. They were not found in California or Idaho.

Subrace 7A, which can attack oat varieties with the so-called Canadian type of resistance at both low and high temperatures, increased from 12 percent in 1960 to 19 percent in 1961 and the second most prevalent race. It was found in 9 of 19 States but most frequently in Minnesota, North Dakota, and South Dakota.

Race 7 (with 12) was third in prevalence, comprising 8 percent of the isolates, a decrease from 1960 of 17 percent.

Race 8 (with 10) decreased from 15 to 7 percent, and race 2 (with 5) decreased from 20 to 3 percent. Other races identified were race 1 (5 isolates), 6A (5), and 8A and 12A (1 each).

The identification of subrace 6A is of particular significance. It can attack virtually all commercial oat varieties that are dependent on genes A, B, D, and E for their resistance. First found in barberry areas of Maine and New York, this race was identified outside of these areas once in 1960, at Urbana, Illinois. In 1961 it was identified twice from Minnesota and once each from South Dakota, Missouri, and New York.

Table 1. Physiologic races of oat stem rust in the U.S. in 1958-1961[a]

Race	Percentage of Isolates			
	1958	1959	1960	1961[b]
2 and 5	14	6	20	3
6 and 13	1	11	24	59
6A	-	-	4	1
7 and 12	54	59	25	8
7A	5	11	12	19
8 and 10	26	11	15	7

a/ Preliminary results as of January 19, 1962.

b/ Based on 214 collections in 19 States.

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*** MISSISSIPPI ***

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

Growing conditions were favorable generally over the State for the 1961 oat crop. Grain yields were good although not equal to the record 1960 yield.

In general, diseases were of only minor importance on the 1961 crop. Crown rust and barley yellow dwarf virus appeared in localized areas but caused little significant damage to commercial varieties. Rust race 264 was identified from a collection made near stoneville.

Soil-borne oat mosaic was severe on some of the experimental strains in the nursery at Stoneville and in North Mississippi at Holly Springs. It was not serious on varieties grown commercially with the exception of Alamo. This was the first noticeable appearance of this disease since 1951 when it was recorded as "mosaic" on CI 5370, CI 5371, and CI 5873. This disease appeared uniformly throughout the nursery. Most of the introductions used in the breeding program for rust resistance and stiff straw were susceptible. However, F_2 and F_3 progenies involving these parents contained resistant segregates.

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*** MISSOURI ***

by J. M. Poehlman, Paul Hoskins, Charles Hayward, Thomas Wyllie, and Oscar Calvert (Columbia); Carl Hayward, (Mount Vernon); Arnold Matson, (Gideon).

Spring weather was again unfavorable for oats seeding. The 1961 Missouri acreage (479,000 acres) is the smallest since 1867. It is about one-half of the 1957 acreage, one-third of the 1955 acreage, and one-fifth of the 1940 acreage. With favorable weather for spring planting, the acreage in 1962 may be larger than last year but there is little possibility that in the next few years it will make any important comeback.

Nodaway oats was distributed in 1961 and 677 acres were grown for certified seed production. Nodaway produces a plump, heavy, white kernel; is moderately resistant to crown rust; contains the ABC genes for stem rust resistance; and produces a distinctive brace root system. Much of the Nodaway seed produced in 1961 is being sold outside of Missouri.

One of the Landhafer infecting races of crown rust, Race 294, was present in Missouri last spring. This is the first time a Landhafer infecting race has been widely distributed in Missouri. Stem rust was very light in 1961. Yellow dwarf was widespread, but damage was much less than in 1959.

New hardy winter-oat strains being tested continue to surpass older varieties by a considerable margin in hardiness. For the second straight year winter-oat strains have exceeded 100 bushels per acre in the yield nursery at Columbia. Columbia is located about 150 miles north of the northern limits of current winter oats production. We believe these strains will extend the production of winter oats well into Central Missouri.

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*** NEW YORK ***

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

Final crop production estimates for the state indicate that 599,000 acres of oats were harvested in 1961. Per acre yeild was 52.0 bushels and total production was estimated at 31,148,000 bushels. These estimates are identical with the revised figures for 1960.

A change in plans on the new Tioga oat was announced during the year. All seed stocks of Tioga were recalled because of excessive other crop and variety mixtures introduced during an out-of-state winter production. Hundreds of spring wheat and barley plants were rogued out but it was found impossible to remove the oat mixtures. This unfortunate occurrence will delay the appearance of Tioga by 2 years, the time necessary to develop new stocks. As a consequence the Niagara variety will precede rather than follow Tioga in release sequence. Persons who may have received Tioga seed for testing are advised that the use of this seed for purposes other than testing is not authorized.

In winter oat studies it is becoming clear that the occasional puzzling and inconsistent survival behavior of Nysel may be due to snow mold and soil borne mosaic. Nysel continues without peer as the hardiest oat in this area.

During the year Sumin Smutkupt completed the MS degree and returned to Thailand, Keith Jones completed the Ph.D. degree and took a position as cotton breeder with the Delta and Pine Land Company of Scott, Mississippi. Arden Colette is on leave of absence, teaching at Colorado State University, but expects to complete the MS degree in March 1962 and return later for Ph.D. work. Colin J. Driscoll, from Australia, hopes to complete Ph.D. requirements in June, 1962 (monosomic analyses in wheat) and will enter post-doctoral work. Helmi Ibrahim, from Egypt, is studying sprouting in wheat. Mrs. Lillie O. Chang is in her second year of post-doctoral work at Cornell. Other students are beginning their graduate program.

Cold Screening of Spring Oats

by E. J. Kinbacher

Most hardy winter oat varieties and selections lack straw strength. A group of stiff strawed spring oat varieties were tested for cold resistance in the freezing chamber. Milford S-225 (C.I. 4893) was found to be significantly more cold tolerant than the other varieties tested. This variety may be helpful in breeding stiff strawed winter oats.

Results of Controlled Temperature Freezing of Stiff Strawed Spring Oat Varieties

Rank	C.I. No.	Variety	Percentage injury
1	4893	Milford S-225	63
2	7317	Craig after lea	75
3	5440	Waubay	77
4	1382	Storm King	77
5	4812	Minor	79
6		Pendek	80
7	7266	Goodfield	81
8	7030	(Cl x [Victy x (Victa x H-J)])	82
9	6662	Garry	83
10	7192	Early Clinton	84
11	7458	Oneida	84
12	6611	Park	85
13	6701	Clintland	85

Four-week-old plants were hardened for one week at 38°F. and frozen for twenty-four hours at 25-27°F.

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*** NORTH CAROLINA ***

by C. F. Murphy (plant breeding and genetics), T. T. Hebert (pathology), D. M. Kline (USDA) and G. E. Spain (Extension). Raleigh.

Breeding Objectives

Approximately 80 percent of the North Carolina oat acreage is utilized as grain. The oat breeding program is thus being directed toward the development of short, early, stiff-strawed, and high test weight oats, with disease resistance. The primary diseases affecting oats in North Carolina are barley yellow dwarf and soil-borne mosaic.

Field infections of BYD virus are being obtained by spreading viruliferous aphids in the field, in the fall. Albion and Fulghum lines (obtained from Henry Jedlinski) are being used as sources of resistance. LeConte, Excel and

Early Ballard are being used as sources of resistance to the soil-borne mosaic virus. Excel shows particular promise as a parent because of its hardiness and good agronomic traits.

The newly released variety Carolee has shown exceptional yield potential despite its rather small seed size. It is hoped that a larger seed size can be incorporated into a "Carolee type" oat. Several large seeded parents (including Burnett) are being used for this purpose.

Yield of Oats on Mosaic Infested Soil

In 1960-61 there were four Official Variety Tests on Small Grains in the Piedmont Section of North Carolina. The tests in Davie and Union Counties were on soil heavily infested with soil-borne oat mosaic while those in Cleveland and Iredell Counties were not infested. Wheat and barley tests were planted adjacent to the oat tests at each location. Since other diseases of small grains apparently caused little or no reduction in yield at any of these locations, it was felt that a comparison of yields on infested and non-infested soil might give some idea of the reduction in yield due to mosaic. Wheat and barley are considered to be immune from soil infection with the oat mosaic virus and are included in the table below as a measure of differences in soil productivity at the infested and non-infested locations.

	Mean yield[1/] at 2 locations on:		
Variety	Non-Infested Soil	Oat Mosaic Infested Soil	Percent Reduction
Wheat (16 varieties)	48.4	42.3	14
Barley (10 varieties)	56.6	52.5	7
Arlington	68.9	43.9	36
Victorgrain 48-93	78.7	37.4	55
Moregrain	101.2	51.8	49
Carolee	95.2	44.1	54
Fulwood	75.0	29.3	61
Woodgrain	57.1	26.7	53
Earlygrain	82.9	36.7	56
Sumter	87.2	63.6	27
Roanoke	88.0	49.9	43
Fairfax	98.0	51.6	47

[1/] Yields in bushels per acre obtained from North Carolina Official Variety Tests.

The above oat varieties include the most resistant varieties available for growing in this area. While the resistance of these varieties is impressive when grown beside highly susceptible varieties in a mosaic infested nursery, indications are that they may still suffer considerable losses in yield when grown on mosaic infested soil.

Extension Highlights

The extension program on oats has been focused on the introduction of Carolee, (described in 1960 Oat Newsletter), demonstrations on adequate fertility, and efforts to try to prevent fall infection of yellow dwarf. More than 40 one-acre demonstrations of Carolee have been held, with yields up to 127 bushels per acre reported. Recommendations were made to delay 1961 fall seeding 10 days to 2 weeks to help avoid the potential large aphid populations. A late summer drought delayed all seeding, however.

A record state average yield for North Carolina, 40.5 bushels per acre, was produced in 1961. The acreage reflects the national trend, down from 492,000 acres to 1956 to 277,000 acres in 1961.

Personnel Changes

Dr. G. K. Middleton retired July 1, and is now serving as an advisor for the North Carolina Crop Improvement Association.

Dr. C. F. Murphy has recently joined the staff at North Carolina State, where he has replaced Dr. Middleton as small grain breeder.

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*** NORTH DAKOTA ***

by H. R. Lund and G. S. Smith, Fargo, North Dakota

1961 Season

Drouth severely curtailed Oat production in this state during the 1961 season. The west and northern sections were especially hard hit. Oat acreage was 1,263,000 acres, down from the long-time average of 1,863,000 acres. Yields were lower than the average of 28.7 bushels/acre with an overall production of 23.0 bushels/acre. Stem and crown rust infection was not a yield factor.

State Yield Trials

To date the old recommended varieties of Ajax, Garry, Rodney, and, in the extreme west, Gopher continue to perform very well. Two newer varieties, Minton and Burnett, appear to offer additional crown and stem rust resistance without loss of yield. Varieties, Nodaway, Russell, Putnam 61, will be tested further in 1962 state-wide nurseries.

Bingham Selections

The straw strength and yielding ability of these oats grown under irrigation in North Dakota for the first time have been, to say the least, spectacular. The severity of the drouth is reflected in the dryland yields in the following table:

Yield Trials at Williston, 1961

Variety	Dryland T.Wt.	Dryland Yld.	Irrigated T.Wt.	Irrigated Yld.	Irrigated Lodging %
CI 7572[1/]	23.5	15.0	35.3	134.8	0
CI 7589[1/]	23.5	15.6	35.0	134.0	0
CI 7571[1/]	23.5	16.2	34.5	138.5	0
Garry	23.5	15.2	36.0	118.9	10
Rodney	25.5	13.7	35.3	137.4	100
Ajax	25.5	14.1	35.9	113.2	90

[1/] [Wintok and Clinton - Santa Fe) x Imp. Garry] x [(Bonda x H-J) x Mo. 0-205]

Breeding Program

Major emphasis will continue to be placed upon straw strength and earliness in the breeding program. An experimental variety, CI 7552, appears to have promise along these lines. The lack of natural stem and crown rust infection in the field has prompted more testing in the greenhouse to common races. Re-selection and purification of older commonly grown varieties, such as Gopher, will also be continued in 1962.

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*** OHIO ***

Oat Production and Research in Ohio

by Dale A. Ray (Columbus)

1961 Production

Wet soil conditions in the seeding and harvesting seasons in Ohio reduced oat production in 1961 by over 40 per cent compared with the previous year. The average yield of 50.0 bushels per acre was the fourth highest on record and generally the harvested grain was excellent in quality. For the third consecutive year, oat diseases were minor in incidence and had little influence on crop performance. Winter oats benefited from extended snow-cover for the months with below-freezing temperatures and excellent yields were reported.

Variety Trials

Four replications of twenty spring oat varieties were grown at Columbus and Wooster and ten of the varieties were compared at five additional state experiment farms in 1961. Each test was seeded with a farm drill and was harvested with a combine. The averages for the seven locations showed Garry with the highest grain yield and Goodfield with the heaviest bushel weight and least lodging.

Dubois and Bronco winter oat varieties were compared in a replicated test at four central and southern Ohio locations. Both varieties gave excellent yield performance.

Oat Investigations

More emphasis was placed on making crosses of high-yielding lines and crown rust resistant parentage. The spring and winter oat head-row plantings were screened rigorously for straw stiffness and for uniformity in early maturity. Several hardy advanced-generation selections of winter oats and the highest-yielding spring oat lines were increased for more extensive yield testing. Studies on the effects of clipping Clintland and Dubois oats on yield and legume establishment were continued. The third year of data on the performance of Clintland and Rodney oat varieties for silage yield and three soybean varieties seeded following oat-silage harvest was summarized. Robert W. Miller has initiated a Ph.D. study on the effects of mechanical and chemical processing of oat kernels on the performance of selected varieties.

Variety Recommendations

Clintland 60, Goodfield and Clarion spring oat varieties are recommended for all areas of Ohio in 1962. Rodney is retained on the recommended list for northern Ohio only.

Norline, Dubois and Bronco winter oats are acceptable for production in southern Ohio but lack sufficient winter-hardiness for general recommendation.

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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)

In breeding better grain varieties for Oklahoma greater emphasis is being placed on straw strength and desirable seed type. These are the major deficiencies of the principal commercial varieties. Germplasm sources being used for these 2 characters are mainly from the 2 winter varieties LeConte and Arkwin Sel. C.I. 7404 and the 3 spring varieties Tonka, Alamo and Goodfield. Other sources used to a limited extent are Arlington, Wintok Sel. X H. Culb. C.I. 7500 and some unnamed selections.

The "snap test" has proven to be the most useful method for evaluating plant material for straw strength. Experience has shown this test to be more reliable when used on lines or plant progenies than on single plants.

One of the difficulties encountered in breeding winter oats for stiff straw has been the failure to incorporate high yielding ability in selections with strong straw. Observations indicate this is due primarily to smaller panicle size and reduced tillering. No difficulty has been experienced in incorporating seed weight or desirable seed type in the stiff-strawed lines. In a yield component study seed weight and seeds per panicle showed much less variety X location and variety X year interaction than panicle number per unit area. As a result of the observations and yield component study panicle size is receiving much attention as a selection criterion.

The breeding procedure generally employed at present is to select for panicle size in the field, examine for seed type (weight, etc.) in the laboratory and evaluate for straw strength the following season.

Early maturity is another important character for grain varieties grown in Oklahoma. Maturity approaching that of the very early variety Cimarron is important as an escape mechanism against the rusts. This degree of earliness also allows the crop to reach a stage of maturity that is not affected by high May temperatures that frequently damage medium and late maturing varieties. Cimarron is the major source of germplasm for early maturity being used in the improvement program; however, the winter-spring crosses usually provide an opportunity for selection of such a character.

The ever-changing pattern of crown rust races has somewhat dampened the enthusiasm in breeding for genetic resistance per se. The escape mechanism (early maturity) and tolerance appear to offer greater dividends in reducing the effects of crown rust. Notwithstanding, some breeding for genetic resistance is being continued using Black Mesdag X Abd. 101 C.I. 7650, KHC R48 C.I. 6665 and Goodfield as sources of resistance.

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*** OREGON ***

by Wilson H. Foote (Corvallis)

Oat production in Oregon in 1961 declined some 2,600,000 bushels. This was primarily the result of shifts in acreage to other crops as the average yield per acre was higher than in previous years.

A new white winter oat variety, Powys, was introduced into the Williamette Valley and produced very satisfactorily. Powys was bred at the Welsh Plant Breeding Station. It has stiff-straw with rather short plump kernels. This variety offers the possibility of becoming very popular in the winter oat area of the Williamette Valley.

Yellow dwarf virus was extremely severe on spring oats in the Williamette Valley in 1961. Yields and quality were seriously affected by the virus. At the present time we are not working very much on this disease.

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*** PENNSYLVANIA ***

by Robert P. Pfeifer (University Park)

A method of searching for male sterility in oats was tried in 1961. Clinton 59 oats were seeded at a very light rate so that plants were individually spaced. Upon heading and before pollination one culm of each plant having more than one culm, was bagged. The bags were removed at maturity and inspection for bagged seedless panicles was made. When a seedless panicle was found the seed from the remaining panicles of the plant were saved to be grown again for two generations to learn if the cause of each seedless panicle was a sterility factor.

One person can bag about 2,500 heads per day and he can remove and inspect about 5,000 heads. Five seedless heads were found in 1961, but it is not yet known if a form of sterility was found or if other causes such as BVDV infection may have caused the occurrence of the seedless heads.

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Winter Oats

by H. G. Marshall (USDA - Pennsylvania)

The major cause of winter killing of winter oats in Pennsylvania during 1961 was the disease snow mold. No resistant lines or varieties were noted in a Clearfield county nursery where very severe killing occurred. However, the varieties C.I. Nos. 6903, 7754, 7404, and 5107 showed low average amounts of killing at that location. Additional varieties that showed relatively little killing from snow mold in the Uniform Northern Winter Oat Nursery at another location were C.I. Nos. 7494, 7495, 7483, 7484, 7489, 7406, 7481, and 7507. Surviving plants grew slowly in the spring, and many plants had various degrees of root and crown rot.

The varieties C.I. Nos. 7480, 7499, and 7500 continued to look very promising in southern Pennsylvania tests and were again superior to both Norline and Dubois for lodging resistance and yield during 1961.

Hybridization Program

The third cycle of the multiple crossing program described in the 1959 Oat Newsletter was essentially completed. A total of 4468 seeds representing 959 crosses were obtained during 1961. Thus, over 9000 crossed seed have been obtained in this program since its initiation in 1959. Most of these crosses will be carried as bulk populations, and they will be grown at several locations each year in order to increase the chances of natural selection for winter hardiness.

Limited interspecific crossing studies have been continued. A number of *Avena strigosa* x *A. longiglumis* and reciprocal hybrids were grown and found to be highly fertile. Thus, the failure of similar hybrids obtained by other investigators to produce seed may have been the result of physiological factors. The hybrids in our studies as well as the *A. longiglumis* parent were subjected to a cool period along with various winter oat hybrids and parent varieties. This may account for their vigorous heading and high fertility. Results from recent freezing tests indicate that *A. longiglumis* is relatively cold resistant.

Winter Hardiness Studies

Mr. Gerald A. Porter completed his M.S. thesis research concerned with certain aspects of the hardening process in winter oats. Field hardened varieties approached their maximum levels of cold resistance by mid- to late November during the falls of 1959 and 1960. Prolonged snow cover during the winter of 1960-61 resulted in a severe reduction in cold resistance and varieties differed as to the rate of reduction.

In cold chamber studies, a hardening treatment of 8 days under 1400 foot candles of light intensity and alternating temperatures (55°F. days, 32°F. nights) resulted in greater cold resistance than that for treatments of other durations and/or lower light intensities. This treatment also gave the greatest separation between varieties of known high cold resistance and low cold resistance. Varietal differentials and relative ranking for cold resistance were affected by light intensity. Hardening at a constant temperature of 38°F. apparently resulted in a more rapid development of cold hardiness than that which occurred under alternating temperatures, but differentiation between the high and low varieties was much less than for certain alternating temperature treatments.

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*** SOUTH CAROLINA ***

by W. P. Byrd, G. C. Kingsland and E. B. Eskew (Clemson)

The estimated per acre yield of oats for 1961 was 35.0 bushels (South Carolina Crop Report, November, 1961) second only to a yield of 36.0 bushels for 1956. It is significant, however, that only 241 thousand acres were harvested for grain compared to 551 thousand in 1956. The most serious problem of oat production for 1961 was the high percentage of lodging which occurred prior to harvest. Arlington and Victorgrain 48-93, which are susceptible to *Helminthosporium victoriae*, were the most severely lodged; however, it was not limited to these varieties. The lodging was generally attributed to a rotting of the culm. (see later paragraph)

New Variety

C.I. 7509, Arlington x (Wintok x Clinton^2--Santa Fe):SC57-167 was named Sumter and released to seed growers in 1961. Interest in the new variety is high and it is hoped it will live up to its advanced "billing".

Recommended Varieties

The following oat varieties were approved for planting in South Carolina in 1961 for grain production.

Piedmont	Coastal Plain
Arlington	Arlington
Moregrain	Moregrain
Sumter	Sumter
Victorgrain 48-93	Suregrain
	Victorgrain 48-93

Also, Arlington, Moregrain and Sumter are considered as best suited for grazing.

Fungi Identified from Samples of Oat Grain

No less than 20 different fungi have been identified on grains of oats obtained from various areas in South Carolina. Results are presented in Table 1. Species of the *Fusarium* and *Helminthosporium* groups are known to cause seedling blight. Certain members of the *Aspergillus* and *Penicillium* groups are regarded as potential threats to grains in storage. In most instances the fungi were present primarily as spore contaminants on the glumes. *Helminthosporium avenae*, on the other hand, frequently had invaded localized areas of the glumes and was present within them.

Table 1. Percent of fungi isolated from caryopses of oats in South Carolina.

Fungus	Percent of total fungi
Alternaria	27.4
Hormodendrum cladosporiodes	19.2
Helminthosporium avenae	9.6
Rhizopus nigricans	6.2
Fusarium roseum	5.8
Aspergillus fumigatus	5.4
Penicillium spp.	5.5

Helminthosporium spp.	5.2
Stigmella (Piricauda) sp.	4.5
Fusarium spp.	3.6
Aspergillus niger	2.9
Miscellaneous[1]	4.7

1/ Aspergillus spp., Nigrospora sphaerica, Trichoderma viride, Phycomyces nitens, Sporotrichum pruinosum, Curvularia lunata, Syncephalastrum racemosum, Mucor jansseni, Stemphylium sp.

Culm Rot of Arlington Oats Observed in Piedmont Area

Harvest of small grains was delayed during June of 1961, due to climatic conditions favoring superfluous precipitation. Concomitant temperatures were 6 degrees to 8 degrees F below the seasonal normal. Serious lodging of Arlington oats occurred during this period in the Clemson vicinity. In one field the area of lodged oats was estimated at 50 to 60 per cent of the total planted. Culms, leaf sheaths, and grains manifested various stages of disease, as evidenced by black lesions or areas of discoloration. Samples of culms and of seed during this period revealed the presence of Helminthosporium avenae. In addition to delaying the progress of harvesting, the inclement weather possibly was conducive to the increase in the incidence of culm rot. This culm infection then contributed to the incidence of lodging.

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*** TENNESSEE ***

by N. I. Hancock (Knoxville)

A new and simple technique for breaking strength, wall thickness and diameter of culms has been tested on samples of oat culms taken just before harvesting. Strength is given in pounds per inch, while wall thickness and diameter of culms measured on Carl Zeiss micrometer are given in millimeters. A simple correlation of .717 for strength versus wall thickness and .659 for strength versus diameter are highly significant on 354 samples of oats, but the correlation .534 for wall thickness versus diameter is not highly significant. Breaking strength has higher linear relationship with wall thickness than with diameter. The mean breaking strengths on 75 culms of LeConte and Forkedeer are shown below as average of 3 breaks, and 3 measurements on each internode of each culm. Forkedeer has uniformly larger diameters than LeConte, but breaking strength and wall thickness are higher than those of Forkedeer.

1.= Pounds per inch break   2.= Wall thickness, mm.   3.= Diameters, mm.

		Forkedeer			LeConte		
		1	2	3	1	2	3
Internode	1	1.03	.30	3.20	1.64	.33	3.09
"	2	0.72	.24	2.98	1.25	.30	2.77
"	3	0.49	.20	2.27	0.66	.26	2.05
"	4	0.28	.11	1.78	0.41	.15	1.54

This technique will be described and illustrated in station publication on "Lodging in Small Grains" which will be published sometime this year.

The derivation of the winter oat varieties - Forkedeer, Fulwin, and Tennex - are given as head row selections out of Winter Fulghum 699-2011; see Tenn. Agr. Exp. Station Bul. No. 199, page 22, 1946. Fulghum 699-2011 was one of the leading winter selections made by Stanton in 1920; see Jour. Amer. Soc. Agron. 18: 804-814, 1926. Yet 30 years later in 1950 he named this selection Pentagon, and designated it as 699-2011, C.I. No. 2499 in his publication of 1955 on "Oat Identification and Classification". But in the recent monograph, "Oats and Oat Improvement", 1961, page 281 (edited by F. A. Coffman) the parental sources of these varieties are given as Pentagon with no designation of its original source as Winter Fulghum 699-2011.

In order to set the record straight, only 5 of the original 2500 head selections out of Winter Fulghum 699-2011, planted the season of 1930-31, were considered worthy of further studies. These were named Fulwin, C.I. No. 2499, Tenn. 1945; Tennex, C.I. No. 3169, Tenn. 1884, and Forkedeer, C.I. No. 3190, Tenn. 092, Tenn. 1922, and Tenn. 090. These last two were not released but used in breeding programs.

The Tenn. Agr. Exp. Station Bul. 325, 1961 describes the Blount variety which was referred to in the 1960 Oat Newsletter.

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*** TEXAS ***

by Paul E. Pawlisch, I. M. Atkins and Dennis Peier, Department of Soil and Crop Sciences, and M. C. Futrell, Department of Plant Science, Texas A & M College, College Station, Texas (In cooperation with Cereal Crops Research Branch, ARS, USDA)

The oat acreage in Texas continues to show emphasis on forage uses. The average seeded acreage of oats for the period 1922-41 was 1,602,000 acres and this increased to 1,940,000 acres for the period 1942-61. On the other hand the harvested acreage for 1922-41 was 1,482,000 acres while that for the period 1942-61 was 1,233,850 acres. The drouth years of the 50's perhaps had some influence on this reduction. The seeded acreage for the 1961 crop in Texas was 2,062,000 acres but, owing to severe spring drouth, some winterkilling, damage by greenbugs, and that grazed to maturity, the harvested acreage was only 1,074,000 acres. The average yield was 27.0 bushels per acre for a total production of 28,998,000 bushels. Diseases were below normal in severity this season.

A new variety, derived from Alamo by irradiation of the seed, now has been named Alamo X and seed was released to certified seed growers in 1961. The new strain differs from Alamo in being resistant to Victoria blight, culm rot and to crown rust races 216 and 290 to which the parent strain is susceptible. The new strain is susceptible to race 294 to which Alamo is resistant. Alamo X has a moderately heavy black awn whereas Alamo has no awns; otherwise, the plant type is very similar. During recent low temperatures in Texas, Alamo X survived better than the parent strain.

One strain from our short-stature oat breeding program was found to be resistant to race 294 in the Puerto Rico tests. This strain, Texas Selection 57C1716 from the cross of (Fulwin-Lee-Victoria x Red Rustproof-Victoria-Richland) x (Bond-Rainbow-Hajira-Joanette x Landhafer), has many other desirable characteristics as well. It ranked second in the College Station nursery in 1961, averaging 80.6 bushels per acre of 39 pound test weight grain. Seed was increased to 9 bushels at Aberdeen, Idaho and about 4 acres has been sown for further increase. Two other adapted experimental strains, selections 263-57-6 and 263-57-12 from the cross of Camellia x C.I. 6574, were resistant to race 13A in Puerto Rico tests and have been promoted to State tests.

Owing to the very large acreage of Suregrain and Moregrain oats, as well as that of Texas varieties which are susceptible to stem rust, it is feared that the stage may be set for a severe stem rust epidemic should weather conditions prove favorable some season. Accordingly, an aggressive backcrossing program to transfer stem rust resistance to adapted varieties was initiated with help of some funds from the Cereal Crops Research Branch. Suitable parents for the crosses were grown to maturity in less than 90 days in the growth chamber described below. However, considerable difficulty with dormancy was encountered in the Suregrain variety and in some crosses with Suregrain.

An air-conditioned chamber was constructed over a greenhouse bench. The chamber has a double wall with an inch of "dead" air space between walls. The inside wall is made of sheets of cellulose nitrate and the outside wall is covered with clear polyethylene. The chamber is 20 x 4 x 4 feet and is temperature controlled with a Friedrich home window unit with a capacity of 23,500 B.T.U. per hour. Temperatures can be maintained in the 60 degree range most of the time, although around noon it may be slightly higher. Under conditions of College Station it is also desirable to have water-cooled pads and ventilation fans for the entire greenhouse.

An evaluation of visual forage estimates of small grains revealed that estimates based on initial growth were not very accurate in predicting yields of recovery growth. Two estimates, that is, one on initial growth and one on recovery growth predicted total clipping yields better than either the first estimate or the estimate of recovery growth. Actual grazing experiments to compare gains from three different growth types of oats and to correlate these gains with clipping yields and visual estimates of forage were started at McGregor this season.

Further collections of so-called "wild" types were made over the State in 1961. Approximately 600 strains are being studied for disease resistance, hardiness or other characters of value. An attempt is being made to classify these and relate them to known varieties or species. Several strains with resistance to races 294 and 264 have been found and many are resistant to Victoria blight.

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*** UTAH ***

by R. W. Woodward (Logan)

Oats had a fairly good year in 1961, although they were considerably shorter than normal. Among the top yielding strains grown in the uniform nursery were C.I. 7573, C.I. 7575, C.I. 7588, and C.I. 7591. Yields ranged from a high of 160 to a low of 115 bushels per acre. Overland and Park still rate among the high yielding strains and are quite ideally adapted to the irrigated areas of Utah. Most of the tall strains such as Uton, Markton, Victory and Swedish Select have been replaced.

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*** WISCONSIN ***

by H. L. Shands (Madison)

** Wisconsin State Oat Yields and Variety Performance **

The 1961 season was generally good for small grain growing and harvesting except for drought in some areas of Wisconsin, especially the northwestern section. The state average yield for oats was 56 bushels per acre, second only to the 61 bushel average in 1958. Bushel weights were generally high.

Early reports suggested that Wisconsin oat acreage was less than any time for the past 20 years. However, in December the Wisconsin Crop Reporting Service stated that Wisconsin had 2,322,000 acres or an increase of 111,000 acres more than in 1960. The percentage acreages of the leading varieties in 1961 were as follows: Beedee, 32; Sauk, 11; Branch, Ajax, and Clintland (60), 7 each; Garry, 6; Goodfield and Rodney, 5 each; and Portage and Minhafer, 3 each. It appears certain that Beedee will lead again in 1962.

Variety Performance

The Wisconsin Seed Certification Service provided yield reports for varieties certified in Wisconsin. Average yields on a non-paired basis are given in Table 1. All variety averages improved over 1960 from 3.5 to 11.5 bushels per acre, reflecting the more favorable growing season even though near-drought conditions were prevalent over most of Wisconsin in late June. These yields do not agree closely with those of regular yield trials, probably because the production fields may be chosen on the basis of fitting agronomic characteristics of the variety. For example, Goodfield is low in most yield tests with Garry and Portage high; yet there is less than three bushels' spread between the group in seed production field reports.

Table 1. Seed Growers' reports of non-paired yields of oat varieties in Wisconsin in 1961 with departure from 1960.

Variety	No. of Growers	Yield in Bu/A	Departure from 1960	Variety	No. of Growers	Yield in Bu/A	Departure from 1960
Ajax	17	53.8	+ 11.1	Dodge	103	58.6	--
Beedee	78	59.0	+ 6.4	Garry	28	59.2	+ 5.3
Branch	18	55.5	+ 10.5	Goodfield	60	57.4	+ 8.5
Burnett	10	55.0	+ 9.4	Minhafer	12	47.9	+ 5.3
Clintland 60	34	54.2	+ 11.5	Portage	92	60.2	+ 7.6
				Sauk	20	54.7	+ 3.5

Crown rust infection occurred late in the kernel-filling period in southern Wisconsin. This type of rust attacked all commonly-grown varieties. Portage and Dodge had least infection and Beedee had slightly more. Goodfield had still more; but less infection than Clintland 60. "RED LEAF" of oats was present but quite minor in most areas of the state. The Septoria disease was prevalent in the Marshfield area.

Garland Released

Garland (C.I. 7453) oats was bred cooperatively by workers of the Wisconsin Agricultural Experiment Station and the U.S. Department of Agriculture with financial support by the Quaker Oats Company. Foundation seed was distributed to growers of certified seed for the first time in 1962. Garland was selected from the same series of crosses as were Goodfield and Dodge.

Performance data indicate that Garland is intermediate (or better) in yield, being higher than Goodfield or Dodge. Plant height is generally uniform and is intermediate between Goodfield and Dodge. Garland resists lodging, but not quite as well as Goodfield. Bushel weight is high as a result of intermediate-to-short plump kernels. Hull color is light yellow and appears dark or chocolate brown under "black light".

Garland has genes A and B for conditioning stem rust response. While Garland is generally crown rust resistant, it isn't as good as Dodge in this respect. Smut reaction is generally resistant. Septoria invasion of stems may be greater than for Goodfield or Dodge. Garland is susceptible to red leaf.

In field appearance Garland resembles the "Bond" varieties. However, Garland may be more widely adapted in Wisconsin than other similar varieties. Competition on fertile soils will be offered for Goodfield, Dodge, Clintland 60, and, to a lesser extent, for Beedee.

Quite a number of workers helped in the development of Garland. They are R. A. Forsberg, L. G. Cruger, P. E. Pawlisch, Z. M. Arawinko, D. C. Hess, L. N. Barker, L. S. Wood, M. L. Kaufmann, D. C. Arny and E. A. Brickbauer. Branch Experiment Station personnel assisted in testing Garland in final phases.

A selection of current interest is C.I. 7561.

Sterility of Oats

In 1960 rows containing sterile-appearing plants were observed. Plants were harvested individually and seed set was determined. Mr. Pavek grew these in progeny rows in 1961 and is comparing them with the male sterile type found in plants from seed obtained in 1960 from J. F. Schafer of Purdue University.

Personnel items. R. A. Forsberg is doing postdoctoral work in Genetics at N.C. State College, L. G. Cruger is a vegetable breeder for Calpack. J. J. Pavek from Minnesota is a graduate assistant, and David Janisch is a project assistant in small grains.

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*** VI. NEW OAT VARIETIES ***

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*** VII. C.I. NUMBERS ASSIGNED TO OATS DURING 1961[1] ***

by J. C. Craddock and F. A. Coffman
USDA, Beltsville, Maryland

During 1961 the World Collection of Oats received 366 additional sources of germ plasm. Plant Introduction (PI) numbers were assigned to 215 entries received from foreign countries. Domestic plant breeders submitted 151 new entries for Cereal Investigation (CI) numbers. Seed stocks of the new additions will be made available for distribution as soon as possible.

CI Number	Name or Designation	Pedigree	Origin
7651	N.Y. 5271aB-2B-22	Cg x Am	N. Y.
7652	GLEN: C.A.N. 826	Aj x Rtn	Canada
7653	REHOVOT	Sel. from Mulga	Israel
7654	MAGNIF 28		Argentina
7655	MAGNIF 29		"
7656	Abd. 60-409	Cdb x Gy (Resel. from J.N. Welsh material)	USDA
7657	Abd. 60-415	Cdb x Gy (Resel. from J.N. Welsh material)	"
7658	Abd. 60-453	Lh 3x Mnd 2x Hj x Jt 4x Ctn 5x P.I. 174544	"
7659	Abd. 60-457	Lh 3x Mnd 2x Hj x Jt 4x Ctn 5x P.I. 174544	"
7660	Belts. 59-115	Hj x Jt 2x Bda 3x SF 4x Os 5x Park	"
7661	Belts. 59-205	Lh x^4 Ctn 5x Os 4x SF 3x Bda 2x Hj x Jt	"
7662	Belts. 59-279	Hj x Jt 2x Bda 3x SF 4x Os 5x Cld	"
7663	Belts. 59-288	Hj x Jt 2x Bda 3x SF 4x Os 5x Cld	"
7664	Belts. 59-293	Hj x Jt 2x Bda 3x SF 4x Os 5x Cld	"
7665	Belts. 59-413	Hj x Jt 2x Bda 3x SF 4x Os 5x Cld	"
7666	Belts. 59-468	Hj x Jt 2x Bda 3x SF 4x Os 5x Hj x Jt 2x Bda 3x SF 4x Ol	"
7667	S.Dak. RROI B60-3-20	Bda 2x Hj x Jt 3x SF 4x Mrn	S. Dak.
7668	BURKE: (PI 193035)		Australia
7669	Ill. 57-1314	Bcn 2x Hy x Vtra 3x Rny	Ill.
7670	Mich. 56-22-1417	Bvr x Gy 2x Ctn 3x Cld 4x Mnr	Mich.
7671	Mich. 56-22-1559	Bvr x Gy 2x Ctn 3x Cld 4x Mnr	"
7672	N.Dak. 55.6 A-2-9-11	Bvr x Gy 2x Ctn 5x Wb 4x Bda 2x Hj x Jt 3x SF	N. Dak.
7673	Minn. II-52-7	Bond x Rb 2x Hj x Jt 3x Lh 4x^3 And	Minn.
7674	Minn. II-52-9	Bond x Rb 2x Hj x Jt 3x Lh 4x^3 And	"
7675	N.Dak. 55.9 A-1-12-2-2	Bda 2x Hj x Jt 3x SF 4x Mrn 5x Rtn 2x Bn x Hj 3x Vtra 4x Ajax 2x Bn x Hj 3x Vtra	N. Dak.
7676	Ill. 30599	Ck x Ak 674 2x Nwt	Ill.
7677	Purdue 543A1-2-2	Cld 3x Ctn^2 x Ak 674 2x Mf	Ind.
7678	Wis. 643-66	Cld 3x Gy 2x Hy x Vtra	Wis.

[1] See 1960 Newsletter for writing abbreviations and pedigrees.

CI Number	Name or Designation	Pedigree	Origin
7679	Purdue 541413-8-1	Cld 60 ^{2}x Mo 0-205	Ind.
7680	Purdue 5414I13-39-2	Cld 60 ^{2}x Mo 0-205	"
7681	Purdue 5414I13-42	Cld 60 ^{2}x Mo 0-205	"
7682	Minn. II-54-2	Lh 3x Mnd 2x Hj x Jt 4x^{2} And 5x Rny	Minn.
7683	Minn. II-54-12	Lh 3x Mnd 2x Hj x Jt 4x And 5x Ctn 6x Rny	"
7684	Mich. 56-30-1439	Mar ^{2}4x Bvr x Gy 2x Ctn 3x Cld	Mich.
7685	Ill. 58-1418	Log 3x Bcn 2x Hy x Vtra	Ill.
7686	Mich. 56-26-1531	Mnr 4x Bvr x Gy 2x Ctn 3x Cld	Mich.
7687	Mich. 56-26-1532	Mnr 4x Nvr x Gy 2x Ctn 3x Cld	"
7688	Ill. 58-2297	Nwt x Gy	Ill.
7689	S. Dak. RROIB 60-3-9	Wb 4x Bda 2x Hj x Jt 3x SF	S. Dak.
7690	Ill. 58-1951	Pnm 5x Lh 3x Mnd 2x Hj x Jt 4x And	Ill.
7691	Purdue 5638E2-4	Pnm ^{4}5x Lh 3x Mnd 2x Hj x Jt 4x And	Ind.
7692	S. Dak. RROI B60-3-8	Wb 4x Bda 2x Hj x Jt 3x SF	S. Dak.
7693	Ill. 30600	Ck x Ak 674 2x Nwt	Ill.
7694	S. Dak. RROI B60-3-10	Wb 4x Bda 2x Hj x Jt 3x SF	S. Dak.
7695	Purdue 541413-5P-1P	Cld 60 ^{2}x Mo 0-205	Ind.
7696	Abd. 60-1067	Cld 5x Os 4x Bda 2x Hj x Jt 3x SF	USDA
7697	Abd. 60-1074	Gy 5x Lh 4x Mnd 2x Hj x Jt 3x SF	"
7698	Abd. 60-1079	Gy 5x Lh 4x Mnd 2x Hj x Jt 3x SF	"
7699	Abd. 60-1089	Gy 5x Lh 4x Mnd 2x Hj x Jt 3x SF	"
7700	Abd. 60-1094	Gy 5x Lh 4x Mnd 2x Hj x Jt 3x SF	"
7701	Abd. 60-1133	Cln 5x Lh 4x Mnd 2x Hj x Jt 3x SF	"
7702	Abd. 60-1121	Os 4x Bda 2x Hj x Jt 3x SF	"
7703	Mass. A-2-1-56	Cg x Gy	Mass.
7704	Mass. C-3-56	Pdx x Gy	"
7705	CHIHUAHUA: (Burt-type)		Mexico
7706	SIERRA: Calif. CAS 5164	Kt x <u>Af</u>	Calif.
7707	WOODGRAIN (T. W. Wood & Sons Seed Merchants, Richmond, Va.)		Va.
7708	EARLYGRAIN " " " " " " " " "		"
7709	Ottawa 4832 Ch.A.	Bcn x Gy$_1$ 2x La 3x Aw	Canada
7710	Ottawa 5055-13	Gy x Ma Uk$_5$ 2x Aw$_1$ 3x Aw	"
7711	Iowa C314-1	Cld x P.I. 174544	Iowa
7712	Iowa C314-3	" " " "	"
7713	Iowa C314-4	" " " "	"
7714	Iowa C314-10	" " " "	"
7715	Iowa C314-11	" " " "	"
7716	Iowa C314-16	" " " "	"
7717	Iowa C314-19	" " " "	"
7718	Iowa C314-22	" " " "	"
7719	Iowa C314-24	" " " "	"
7720	Iowa C314-27	" " " "	"
7721	Iowa C314-36	" " " "	"
7722	Iowa C314-39	" " " "	"
7723	Iowa C314-40	" " " "	"
7724	Iowa C375-19	Ctn " " "	"
7725	Iowa C375-42	" " " "	"

C.I. Number	Name or Designation	Pedigree	Origin
7726	Wis. X652	P.I. 174544 x Lh x^4 Ctn	Wis.
7727	Fla. Plant No. 24	Fl1 (X)	Fla.
7728	Fla. Plant No. 28	" "	"
7729	Fla. Plant No. 36	" "	"
7730	Fla. Plant No. 57	" "	"
7731	Fla. Plant No. 65	" "	"
7732	Fla. Plant No. 73	" "	"
7733	Fla. Plant No. 147	" "	"
7734	Fla. Plant No. 155	" "	"
7735	Fla. Plant No. 164	" "	"
7736	Fla. 9-221	Fl1 Sel. N_4	Fla.
7737	Fla. QR 12301	" " " (Puerto Rico '57-58, Row 4655)	"
7738	Fla. QR 12301	Fl1 Sel. N_4 (Puerto Rico '57-58, Row 4656)	"
7739	Fla. QR 12301	Fl1 Sel. N_4 (Puerto Rico '57-58, Row 4657)	"
7740	Belts. 61-69	Cl^2 X SF 2x Wtk 3x Alt	USDA
7741	Fla. QR 12301	Fl1 Sel. N_4 (Puerto Rico '57-58, Row 4659)	Fla.
7742	Fla. QR 12301	Fl1 Sel. N_4 (Puerto Rico '57-58, Row 4660)	"
7443	Fla. QR 12301	Fl1 Sel. N_4 (Puerto Rico '57-58, Row 4661)	"
7744	Fla. QR 12301	Fl1 Sel. N_4 (Puerto Rico '57-58, Row 4662)	"
7745	Fla. QR 3991-4	Minn. 0-200-10 x Sln_3 2x P.I. 197278	"
7746	Mo. 04907	Nsl x HC	Mo.
7747	Mo. 04911	Nsl x HC	"
7748	Mo. 04900	Nsl x HC	"
7749	Mo. 04901	Nsl x HC	"
7750	Belts. 61-457	Wtk x HC 4977 2x Alt	USDA
7751	Mass. 4A-1-59	HC x Nsl 2x Dbs	Mass.
7752	Mass. 13A-1-59	Dbs x Nsl	"
7753	Mass. 13A-2-59	Dbs x Nsl	"
7754	Pa. 57-3379	Wtk x HC	Pa.
7755	Belts. 61-70	Ctn^2 x SF 2x Wtk 3x Alt	USDA
7756	Belts. 61-187	Hj x Jt 2x And 3x Lh 4x Mnd $5x^2$ Alt	"
7757	Belts. 61-73	Hj x Jt 2x And 3x Lh 4x Mnd 5x Alt 6x Ltr 2x Ctn^2 x SF	"
7758	Belts. 61-623: Okla. Str. 6810	Alt x Wtk	"
7759	Belts. 61-122	Hj x Jt 2x And 3x Lh 4x Mnd 5x Bl	"
7760	Belts. 61-412	Bl x Smh 7	"
7761	Belts. 61-138	Bda 2x Hj x Jt 3x SF 4x Os 5x Ctn^4 x Lh 6x Bl	"
7762	Belts. 61-149	Bda 2x Hj x Jt 3x SF 4x Os 5x Ctn^4 x Lh 6x Bl	"

CI Number	Name or Designation	Pedigree	Origin
7763	Belts. 61-150	Bda 2x Hj x Jt 3x SF 4x Os 5x Ctn^4 x Lh 6x Bl	USDA
7764	Belts. 61-160	Hj x Jt 2x SF 3x Bda 4x Vtg 5x Bl	"
7765	Belts. 61-474	RR 2x Vtra x Rl 3x Lee x Vtra 2x Fwn 4x Ctn^2 x SF	"
7766	Belts. 61-224	Snl x Fwn	"
7767	Belts. 61-624: Okla. Str. 6814	Wtk x Vtg 48-93	"
7768	Belts. 61-337	Wtk x HC 4977 2x Len	"
7769	BLOUNT	Len x Fwn Str. 6 2x SF	Tenn.
7771	Belts. 61-466	Wtk x HC 4977 2x Alt	USDA
7772	Belts. 61-351	Wtk x HC 4977 2x Len	"
7773	Belts. 61-475	RR 2x Vtra x Rl 3x Lee x Vtra 2x Fwn 4x Ctn^2 x SF	"
7774	Belts. 61-142	Bda 2x Hj x Jt 3x SF 4x Os 5x Ctn^4 x Lh 6x Bl	"
7775	Belts. 61-114	Hj x Jt 2x Mnd 3x And 4x Lh 5x Bl	"
7776	Belts. 61-119	Hj x Jt 2x Mnd 3x And 4x Lh 5x Bl	"
7777	Belts. 61-123	Hj x Jt 2x Mnd 3x And 4x Lh 5x Bl	"
7778	Fla. 59-509	Ctn^2 x SF 2x Wtk 3x Alt 4x Fr	Fla.
7779	Tex. 263-57-6	Hj x Jt Fwn 3x Lee x Vtra 4x Bond x Ath 5x Lh 6x Cml	Tex.
7780	Tex. 263-57-12	Hj x Jt 2x Lee x Vtra 3x Fwn 4x Bond x Ath 5x Lh 6x Cml	"
7781	Fla. 59-RR558	Hj x Jt 2x Bond x Rb 3x SF 4x Sln 5x D.L.M.	Fla.
7782	Ark. 3-74	Lee x Vtra 2x Fwn 3x Bda 4x Lh 5x Mgr	Ark.
7783	N. Dak. 56.18 A-1-1-1-1	Rny x Gy	N.Dak.
7784	N.Dak. 56.14 A-1-5-4	Rtn x R.L. 1276 2x Ajax x R.L. 1276 3x Gy	N.Dak.
7785	Fla. 60-Ab 320	Vtg x Ck 52-22 2x SF x Ctn 3x Sac 4x Hj x Jt 5x K.H.C. 48, Ind. Sel. 3	Fla.
7786	Belts. 61-468	Wtk x HC 4977 2x Alt	USDA
7787	Belts. 61-219	Ctn^2 x SF 2x Wtk 3x Alt 4x Fll (X)	"
7788	Belts. 61-221	" " " " " " " " " "	"
7789	Belts. 61-130	Hj x Jt 2x Mnd 3x And 4x Lh 5x Bl	"
7790	Belts. 61-134	Hj x Jt 2x Bda 3x SF 4x Os 5x Ctn^4 x Lh 6x Bl	"
7791	Belts. 61-152	Hj x Jt 2x Bda 3x SF 4x Vtg 48-93 5x Bl	"
7792	Delta B4024	Ctn^2 x SF 2x Wtk 3x Gy	Miss.
7793	Ark. 2-51	Mgr x Vtg 48-93 2x Dst	Ark.
7794	Tex. 58D5757	Hj x Jt 2x Bond x Rb 3x Lh 4x NN	Tex.
7795	Belts. 61-201	Ctn^2 x SF 2x Wtk x Gy 3x Alt x Ctn^2 x SF 2x Wtk	USDA
7796	Belts. 61-617	Ctn^2 x SF 2x Tsp 3x Vtg 48-93	"
7797	Belts. 61-214	Wtk x Ctn^2 2x SF 3x Alt 4x Fll (X)	"
7798	Belts. 61-218	" " " " " " " " " "	"
7799	Belts. 61-220	" " " " " " " " " "	"
7800	Belts. 61-222	" " " " " " " " " "	"
7802	Belts. 61-67	Ctn^2 x SF 2x Wtk 3x Alt	"

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