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# OAT NEWSLETTER

Vol. 27



April 1977

Sponsored by the National Oat Conference

1976

# OAT NEWSLETTER

Volume 27

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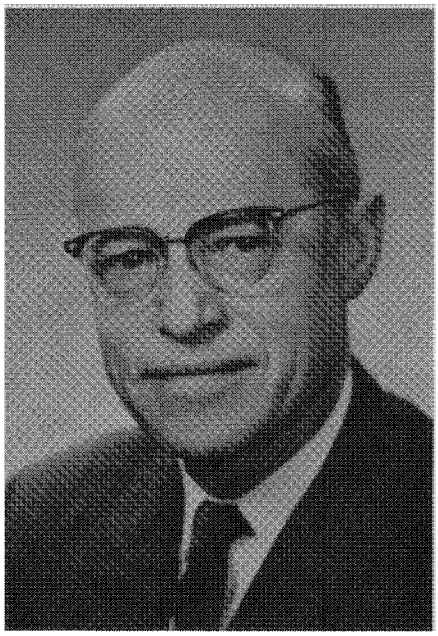
April 1977

Sponsored by the National Oat Conference

Marr D. Simons, Editor



**R. M. Caldwell**

**In memory**

Ralph M. Caldwell, Professor Emeritus of Botany and Plant Pathology at Purdue University and Consultant, DEKALB AgResearch, Inc., was born June 27, 1903 at Brookings, South Dakota. He obtained a B.S. degree from South Dakota State University in 1925, and was awarded the M.S. and Ph.D. degrees at the University of Wisconsin in 1927 and 1929, respectively. He served as Leader for Barberry Eradication in Wisconsin from 1928 to 1930 when he joined the Purdue University staff as a USDA Plant Pathologist and took charge of the Small Grain Disease Control Project. He headed the Department of Botany and Plant Pathology from 1937 to 1954 when he returned to full time research in small grain improvement until his retirement in 1971. In 1971 he joined the Wheat Research Department of DEKALB AgResearch, Inc., as Wheat Consultant and served in this capacity until his death on November 2, 1976.

Dr. Caldwell was co-developer of two winter oat varieties and 13 spring oat varieties at Purdue University. In the winter varieties, spring oat by winter oat crosses were utilized to improve the straw strength, disease resistance, and winter hardiness of winter types. In the spring oat varieties, improvements were made for disease resistance, strong and shorter straw, plump grain and adaptation.

Dr. Caldwell's research with crown rust of oats established the concept of tolerance to rusts and the relative economic importance of tolerance, and called world-wide attention to the phenomenon. His research with crown rust also formed the basis for recognition of the "slow rusting" phenomenon and its value as a type of general resistance to disease. His interest in general (non-specific) resistance to disease occupied his last several years of research. His previous work

with "slow mildewing" in wheat and "slow rusting" with crown rust of oats and leaf and stem rust of wheat led him to ascertain that the same phenomena explained the high level resistance in maize to *Puccinia sorghi*. Data demonstrating his conclusions had been collected and a paper was in the process of being written at the time of his death.

Dr. Caldwell directed the research of many outstanding graduate students and was the author of numerous research papers and station bulletins. He was a member of Alpha Zeta, Gamma Alpha and Sigma Xi honorary societies. He was honored as a Fellow of three societies: The American Society of Agronomy, The American Phytopathological Society and The American Association for the Advancement of Science. In 1970 he was recognized for "Distinguished Service to Oat Improvement" by the National Oat Conference. In 1973, he was awarded the "Distinguished Alumnus Award" by South Dakota State University.

**F. A. Coffman**

**In memory**

Franklin A. Coffman, formerly Principal Agronomist in Oat Investigations, Agricultural Research Service, U.S. Department of Agriculture died December 20, 1976. He was born in Jewel, Kansas, December 30, 1892. Mr. Coffman received the BSA and MS degrees from Kansas State College in 1914 and 1922, respectively. He took further graduate studies in the U.S. Department of Agriculture Graduate School from 1924 to 1928.

Mr. Coffman was on the staff at the Agricultural Experiment Station in the Philippines from 1914 to 1916; Assistant Botanist, Kansas State College in 1916 and 1917; and started his career in the U.S. Department of Agriculture as a field assistant in 1917. He conducted breeding and cultural research on cereals at Akron, Colorado, from 1918 through 1923. In January 1924 he was assigned to the Oat Project, Cereals Office, U.S. Department of Agriculture and transferred to Arlington, Virginia. He was stationed there and at Beltsville, Maryland, until he retired in 1962. After retirement, he was a Collaborator of the Agricultural Research Service until his death. He also was a Consultant to the University of Florida in 1963.

Mr. Coffman was a long-time member of the American Society of Agronomy and the Crops Science Society of America. He was elected a Fellow of ASA in 1949. He was a member and Fellow of the American Association for the Advancement of Science and a Member of the American Genetic Association. He received the Superior Service Award from the U.S. Department of Agriculture in 1962. He received the Distinguished Service Award in Agriculture from Kansas State University in 1966. He also received an award from the National Oat Conference in 1970 for ".....Meritorious service toward making oats a successful agricultural crop species."

Mr. Coffman made outstanding contributions in the fields of breeding, genetics, and pathology of the cereals during the 45 years of his active research career. He was in oat research from 1924 until long after his retirement. He was Secretary of the National Oat Conference from 1950 until 1962 and leader of the U.S. Department of Agriculture oat research program in the Southern and Eastern States from 1950 to 1962. He had about 130 publications on oats, and also edited and contributed to ASA Monograph No. 8, "Oats and Oat Improvement". His last publication was a U.S.D.A. Technical Bulletin on the history and classification of oat varieties which was in press at the time of his death.

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# I. NOTES

## ORGANIZATION OF THE NATIONAL OAT CONFERENCE

### EXECUTIVE COMMITTEE

| | |
|---|---|
| Chairman | C. F. Murphy |
| *Past Chairman | C. M. Brown |
| *Secretary | L. W. Briggle |
| *Editor of Newsletter | M. D. Simons |

### REPRESENTATIVES

| | |
|---|---|
| North Central Region | D. D. Stuthman<br>D. T. Sechler<br>M. D. Simons |
| Southern Region | C. F. Murphy<br>M. E. McDaniel |
| Western Region | D. M. Wesenberg<br>C. F. Konzak |
| North Eastern Region | H. G. Marshall<br>N. F. Jensen |
| U.S.D.A., Technical Advisor | H. G. Marshall |
| U.S.D.A., National Program Staff (Small Grains) | L. W. Briggle |

*Non-voting members

## NEWSLETTER ANNOUNCEMENTS AND INSTRUCTIONS

Overseas contributions - Foreign contributors are urged to anticipate the annual call for material for the next Newsletter and to submit articles or Notes to the editor at any time of the year.

Available back issues - Back issues of certain volumes are available on request. Please write the editor.

Variety descriptions - When you name or release a new variety, in addition to your account in the State report section, please submit a separate description to be included under "Oat Cultivars". We would like to make the "Oat Cultivars" section as complete and useful as possible.

PLEASE DO NOT CITE THE OAT NEWSLETTER IN PUBLISHED BIBLIOGRAPHIES

Citation of articles or reports of Newsletter items apparently is causing some concern. The policy of the Newsletter, as laid down by the oat workers themselves and later reiterated, is that this letter is to serve as an informal means of communication and exchange of views and materials between those engaged in oat improvement. Just as definitely, no material is wanted which is of a nature that fits a normal journal pattern. Each year's call for material emphasizes this point. Unless there has been a change of thinking the oat workers do not aspire to a newsletter that would in any way discourage informality, the expression of opinions, preliminary reports, and so forth.

Citing the Newsletter creates a demand for it wouside the oat workers' group. For example, libraries send several requests a year for it and we refuse them (if the Newletter were made available to libraries it could not be produced as we now do it because the mailing list would approximately triple in number). So why cite it in a bibliography?

Certain agencies require approval of material before it is published. Their approval of material which goes into the Newsletter is a different evaluation from approval for publishing. Abuse of this informal relationship by secondary citation could well choke off the submission of information. One suggestion which may help: If there is material in the Newsletter which is needed for an article, contact the author. If he is willing, cite him rather than the Newsletter. This can be handled by the phrase "personal communication".

## 1978 American Oat Workers Conference

### Preliminary Announcement

The 1978 American Oat Workers Conference will be hosted by Dr. M. E. McDaniel and his colleagues at College Station, Texas on March 20-22, 1978.

Earlier, tentative plans had called for Dr. McDaniel to plant a special demonstration nursery in south Texas, and a visit to this nursery and other points of interest to oat workers in south Texas would be part of the Conference program. This special nursery would emphasize rust, but entries from all oat workers would be welcome. Please send sufficient seed of each entry for planting a short row to Dr. McDaniel in time for planting in the fall of 1977.

## MILLING OATS IMPROVEMENT ASSOCIATION BECOMES A REALITY

Donald J. Schrickel
The Quaker Oats Company

On November 8, 1976 the Milling Oats Improvement Association held its first formal meeting in Minneapolis, Minnesota. Members of the Association are: Ralston Purina Company; General Mills, Inc.; LaCrosse Milling Company; National Oats Company and The Quaker Oats Company.

Bylaws of the Association state that the primary purpose is to promote the research of oats production on a state and national basis. It is the intention of members to become acquainted with research needs and then support state and national funding to satisfy these needs.

Membership dues are assessed on the basis of volume of oats used by the member.

Associate memberships will be offered to persons interested in oats research, whether public employees (State or Federal) or privately employed. They will be welcome to attend membership meetings. Associate members will not be assessed dues. However, they do not have voting privileges nor may they hold office in the Association.

Headquarters of the Association will be located in Minneapolis, Minnesota, but at this date arrangements are not complete for office facilities. Anyone who wishes to contact the Association may do so by writing to the following address: Mr. Scott Hackett, Milling Oats Improvement Association, c/o General Mills, Inc., Box 15003, Commerce Station, Minneapolis, Minnesota 55415.

Oat workers are invited to become associate members of the Milling Oats Improvement Association. To express your interest you may contact Mr. Hackett who will furnish you with a copy of the bylaws and enter your name as an associate member.

## 1976 North Central (NCR-15) Oat Workers Field Day

North Central oat workers took advantage of both the geographical proximity and the hospitality of their Illinois and Indiana colleagues in 1976. The group toured the University of Illinois oat program at Urbana on June 14 under the guidance of C. M. Brown and H. Jedlinski. We proceeded to Lafayette during early evening and were ably escorted by H. W. Ohm, F. L. Patterson, and G. E. Shaner at Purdue University on June 15. Approximately 25 were in attendance, and the efforts of the hosting individuals were very much appreciated.

### University of Illinois, Urbana

The need for tolerance to the red leaf virus (BYDV) was dramatically evident in nearly all sections of the nursery. Varieties and test selections without some degree of tolerance were often damaged to the point of complete kill. The severe virus infection in uninoculated plots of winter wheat was aided by the very mild fall in 1975 which facilitated aphid activity later than normal. This conclusion was supported by a winter wheat date-of-planting experiment in which Sept. 26 and Oct. 10 plantings were severely infected with virus, a vivid contrast to the vigorous stands from Oct. 20 and later plantings. Infected winter wheat also provided a BYDV reservoir for spread to spring oats.

Augmented Nursery. Dr. Brown utilizes a large, nonreplicated performance trial to obtain preliminary yield, agronomic, and disease data. Each plot consists of four rows, 10 feet long, with the center two rows (8'+8') harvested for yield. There are three check entries for each 17 test selections, and relative performances are based on deviations from the checks.

Breeding and Genetic Nurseries. The group inspected entries in a special protein and oil series (hill plots), in an "advanced" yield trial, in a seed-increase series, and in the drill-plot nursery. One special study involved the character "liguleless," which is tightly linked with the "side-oat" trait. Entries in the Uniform Midseason and Uniform Early Oat Performance Nurseries were also inspected.

Pollen Control Agent. Dr. R. R. Johnson described the effects of DPX 3778 as a pollen control agent on spring oats, spring wheat, and winter wheat. DPX 3778 prevents anther dehiscence, in contrast to gamete degeneration caused by gametocides. DPX 3778 exerted good control over anther dehiscence in spring wheat in 1975, less control with undesirable side effects in spring oats, and it was much less effective in winter wheats. High temperatures and lack of moisture resulted in less promising results in 1976.

Interplanting. The group observed interplanting experiments involving soybeans in winter wheat and in spring oats.

Equipment. Small-plot planting and harvesting equipment was inspected. The self-propelled, modified Vogel, two-row combine drew special attention.

Purdue University, West Lafayette

Breeding Nurseries. Dr. Ohm reported that they perform nearly all oat crossing in the greenhouse using the approach method. $F_2$ populations are thin-planted in 8-foot rows and are both panicle selected and harvested in bulk by cross for planting in $F_3$ drill strips. Head (panicle) rows, two preliminary yield nurseries, the main oat performance nursery, and a replicated drill-plot test were inspected. Breeding for resistance to red leaf (BYDV) and to leaf (crown) rust receive special attention, along with emphasis on increasing oat groat protein. Entries in the Uniform Midseason and Uniform Early Oat Performance Nurseries were inspected; halo blight readings taken earlier were reviewed.

Protein. Mark Iwig described part of his Ph.D. thesis research concerned with (1) estimating genotypic variances and partitioning them into components due to additive, dominance, and additive x additive genetic effects for percent protein, yield, and other traits, and (2) the effect of the barley yellow dwarf disease on percent protein and percent oil. Test material consisted of lines in the $F_6$ derived from a cross of an *Avena sterilis* derived line (high percent protein, susceptible to BYD) with an *A. sativa* line (low percent protein, tolerant to BYD).

Special Studies involving DPX 3778 (a pollen control agent), the interseeding of oats and crambe, and oat blends were observed and discussed.

Slow Rusting. Roger Kuhn discussed his thesis research with slow leaf-rusting resistance in winter wheat. He described trials to compare yields of lines with slow leaf-rusting resistance, lines with hypersensitive resistance, and lines susceptible to leaf rust under control and diseased conditions. It was noted that leaf rust, mildew, and Septoria develop slowly on Knox.

Hybrid Wheat. Dale Wickersham described his thesis research on the inheritance of fertility restoration. He is using the *Triticum timopheevi* cytoplasm and genetic restorer genes from several sources in field and greenhouse studies.

Crossing Wheat in Isolation Blocks. Dr. Fred Patterson demonstrated his use of isolated wheat crossing blocks (about 20' x 20') to facilitate crossing among $F_1$ plants for several consecutive generations (cycles).

Winter Wheat Nursery. Entries in the advanced nursery performance trial, and in the Uniform Eastern Soft Red Winter Wheat Nursery were observed.

Respectfully submitted,

R. A. Forsberg
Secretary, NCR-15

## OATS: WILD AND CULTIVATED
## A MONOGRAPH OF THE GENUS AVENA L. (POACEAE)

Bernard R. Baum
Biosystematics Research Institute
Agriculture Canada, Ottawa, Canada K1A 0C6

Approximately 500 pp., 8½" x 11", with 331 figures in 131 plates. Will appear in the second quarter of 1977 and is published by Agriculture Canada.

This book supersedes the monograph by A. I. Malzew, Wild and Cultivated Oats, published in Russian in 1930 as the 38th Suppl. of Bull. Appl. Bot. Genet. Plant Breed., Leningrad.

The author provides a comprehensive taxonomic treatment of all the known species of oats (Avena) and their hybrids. This group of plants contains some species that are in worldwide cultivation, others that are wild, and still others that cause serious problems as weeds. All are important as sources of genes for improvement of the crop. This book will be a valuable reference for research workers, university professors, taxonomists, and students, and it merits a place in scientific libraries, museums, and herbaria.

To reinvestigate the classification of oat species, the author has combined micromorphological techniques with the most recent methods of numerical taxonomy and the use of computers. He has used the latest advances in methods for revising a plant genus, such as modern techniques of classification, phylogenetic analysis, automatic generation of keys, and computer mapping.

The well-illustrated text is in three parts.

Part 1. General--deals with subjects such as anatomy, archeology, species concepts, generic limits, classification, fatuoids, identification keys, and other related topics.

Part 2. Systematic treatment of species--describes the species and their hybrids with data on distribution, nomenclatural notes, phenology, and so on.

Part 3. Digest--contains all names given to various taxa recognized in Avena since Linnaeus (1753), with extensive cross-references.

# Organization of Oat Improvement Research by the Agricultural Research Service, U. S. Department of Agriculture

H. G. Marshall and L. W. Briggle

The purpose of this note is to describe the present program structure of oat improvement research by the Agricultural Research Service and to list the scientists involved at the various locations. The basic plans for most of the current oat improvement research are spelled out in a sub-program under ARS National Research Program (NRP) No. 20050: "Breeding and production - wheat, oats, barley, rice, and other small grains." Dr. Lee Briggle is the National Program Staff coordinator of this program and serves as team leader of a group of Technical Advisors for all small grains. Dr. Harold Marshall is the Technical Advisor for oats under this NRP. Dr. Marr Simons serves as Technical Advisor for oat diseases under NRP No. 20270: "Crop disease and nematode control." Briefly stated, Technical Advisors are to serve as technical consultants to other ARS scientists, Research Leaders, National Program Staff Coordinators, and are expected to encourage and foster communications among scientists working on oats. Technical Advisors are not members of the National Program Staff and have no supervisory, financial, or management responsibilities outside of their own research programs - these responsibilities rest with the Regional Administrators, Area and Center Directors, Laboratory Chiefs and Research Leaders.

Another role of ARS scientists in oat improvement is coordination or regional and national oat performance nurseries. The coordinators and nurseries involved are as follows:

| Coordinator | Nurseries |
|---|---|
| H. G. Marshall<br>Dept. of Agronomy, Tyson Bldg.<br>Pennsylvania State University<br>University Park, PA 16802 | Uniform Winter Hardiness<br>Uniform Northern Winter Oat<br>Uniform Central Winter Oat<br>Uniform Southern Winter Oat |
| H. W. Rines<br>Dept. of Agronomy<br>University of Minnesota<br>1509 Gortner Ave.<br>St. Paul, MN 55108 | Uniform Early Spring Oat<br>Uniform Midseason Spring Oat |
| D. M. Wesenberg<br>USDA, ARS<br>University of Idaho Research and Extension Center<br>P. O. Box AA<br>Aberdeen, ID 83210 | Uniform Northwestern States Spring Oat |

Most of you in oat improvement research cooperate by growing one or more of these uniform oat performance nurseries. Any state or federal scientists who wish to become cooperators, or expand their cooperation to additional nurseries, should contact the appropriate coordinator. Annual reports are distributed by the coordinators.

Finally, the list of ARS scientists devoting part or full time to oat improvement research is as follows:

Aberdeen, Idaho

| | |
|---|---|
| Wesenberg, Darrell M. (Dr.) | Res. Agronomist<br>50% oat breeding<br>50% barley breeding |

Ames, Iowa

| | |
|---|---|
| Simons, Marr D. (Dr.) | Res. Plant Pathologist<br>100% Oat Pathology - (Crown rust) |

Brookings, South Dakota

| | |
|---|---|
| Jensen, Stanley G. (Dr.) | Res. Plant Pathologist<br>25% oats<br>30% wheat<br>25% barley<br>20% grasses |

Gainesville, Florida

| | |
|---|---|
| Luke, Herbert H. (Dr.) | Res. Plant Pathologist<br>20% oats - (Diseases of Southeastern U.S.)<br>70% wheat<br>10% rye |

Ithaca, New York

| | |
|---|---|
| Rochow, William F. (Dr.) | Res. Plant Pathologist<br>100% Oat Pathology - (Viruses, primarily BYDV) |

Madison, Wisconsin

| | |
|---|---|
| Peterson, David M. (Dr.) | Res. Plant Physiologist<br>100% Oat Physiology |
| Youngs, Vernon L. (Dr.) | Res. Chemist<br>100% Oat Quality<br>In charge of National Oat Quality Laboratory |

Palmer, Alaska

| | |
|---|---|
| Taylor, Roscoe L. (Mr.) | Res. Agronomist<br>25% Oat Breeding |

St. Paul, Minnesota

| | |
|---|---|
| Rothman, Paul G. (Dr.) | Res. Plant Pathologist<br>100% Oat Pathology - (Stem and crown rust) |

University Park, PA

| | |
|---|---|
| Hite, Raymond E. (Dr.) | Res. Plant Pathologist<br>100% Oat Pathology - (Diseases of Northeastern U.S.) |
| Marshall, Harold G. (Dr.) | Res. Agronomist<br>100% Oat Breeding |

Urbana, Illinois

| | |
|---|---|
| Jedlinski, Henry K.(Dr.) | Res. Plant Pathologist<br>Oat Pathology - (Viruses, primarily BYDV) |

# MINUTES OF MEETING OF THE AMERICAN OAT WORKERS CONFERENCE COMMITTEE
## BELTSVILLE, MARYLAND
## April 26-27, 1976

Official representatives and Executive Committee members in attendance: C. F. Murphy, M. D. Simons, L. W. Briggle, D. D. Stuthman, D. T. Sechler, M. E. McDaniels, F. C. Collins, D. M. Wesenberg, N. F. Jensen, and H. G. Marshall. Others in attendance: K. J. Frey, J. E. Grafius, D. Schrickel, J. C. Craddock, R. A. Kilpatrick, P. S. Baenziger, W. M. Dowler, and E. G. Strand.

As chairman of the American Oat Workers Conference (AOWC), C. F. Murphy presided over this special meeting of the AOWC Committee. To open the meeting he introduced Dr. Edith C. Weir, Assistant Director of the Beltsville Agricultural Center, who welcomed the Group. Dr. Weir also presented a pictoral review of ARS research at Beltsville.

Chairman Murphy's next action was to yield the floor to L. W. Briggle who announced that it was necessary for him to resign as Secretary of the AOWC because of the demands of his current position on the National Program Staff of ARS. He also indicated that he should be replaced as ARS representative on the AOWC Committee by the ARS National Technical Advisor for Oat Research.

After a brief discussion, Jensen moved that Marshall be elected Secretary. The Motion was seconded by Stuthman and passed by the Committee.

The first two participants on the circulated agenda, Simons and Grafius, were initially absent because of travel delays. Murphy postponed the status report on the Oat Newsletter. In the absence of Grafius, chairman of a special committee (Grafius, Marshall, and V. D. Burrows) to draft a charter of organization for the AOWC, Murphy asked Marshall to review the tentative draft for suggested changes. Considerable discussion of the tentative draft followed. Major changes or additions suggested and approved by the Committee were:

1. The AOWC should continue to meet every four years, but the Executive Committee should have authority to call emergency meetings of the Conference and special meetings of the AOWC Committee as necessary.

2. The Executive Committee of the AOWC should function as a nominating committee for a slate of officers to be elected at each regular meeting (every four years) of the AOWC.

3. The AOWC Committee should consist of a minimum of one official representative from each of the four major regions in the U. S. A., one representative each from the Eastern and Western Regions of Canada, one representative each from the American and Canadian Departments of Agriculture, and one Mexican representative. In addition, three representatives shall be elected at large by the AOWC during the business meeting to be held at regular meetings of the Conference. Thus, the total voting membership of the Committee

shall not exceed 13 (including the elected chairman of the Conference who may or may not already be serving as a regional or agency representative). The Past Chairman, Secretary, and Editor of the Oat Newsletter shall be non-voting members of the AOWC Committee.

4. Where U. S. A. regions do not have appropriate Regional Committees to elect representatives to the AOWC, the Secretary of the Conference shall contact oat workers within a region by mail once every four years and solicit nominations for representative and subsequently conduct an election by mail ballot.

At this point there was some discussion regarding American and Canadian Department of Agriculture representation on the AOWC Committee. Briggle moved that the Technical Advisor for oats be the official ARS representative. This motion was seconded and passed. The current Technical Advisor is H. G. Marshall. It was decided that the Canadian equivalent of the U. S. A. Oat Technical Advisor would be the appropriate representative for the CDA. The special committee working on the charter draft is to learn the title of the CDA representative and include it in the appropriate place in the draft.

A standing Committee on Oat Gene Nomenclature is specified by the charter draft. After some discussion, Marr Simons was asked to rewrite that section of the draft and to send his version to Chairman Grafius.

At this point the discussion of the tentative charter of organization for the AOWC ended. The tentative draft will be presented to the Conference for action at the next regular meeting.

Simons reported on the status of the Oat Newsletter and indicated that the 1975 edition was about ready for mailing to the membership. He also reported that the section on oat literature citations in the 1975 Newsletter will be supplemented by citations from a systematic literature search.

Discussion next centered on the desirability and feasibility of establishing an oat conference of international scope. The eventual decision was to invite a selected group of foreign scientists to attend the next Conference and present papers on the program. Chairman Murphy was instructed to appoint an ad hoc committee to select the scientists to be invited.

Various participants also emphasized the need to include a broader spectrum of interests from within the U. S. A. (e.g. extension specialists, economists, APHIS personnel) when encouraging and inviting participation in AOWC meetings.

It was suggested that the Secretary should announce future AOWC meeting dates and locations in the American Society of Agronomy Newsletter, Crops and Soils magazine, and other appropriate publications that announce such meetings. The Secretary also was instructed to submit news items about meetings that have been held.

Craddock reported that the Oat Germ Plasm Collection is growing about 1% per year, and discussed the *Avena sterilis* and *A. fatua* seed increase projects.

He passed out sample, one page descriptions of a few oat varieties, and indicated plans to do these for all oat varieties (like the Wheat Variety Handbook). Group discussion followed regarding the need to systematically classify entries in the Collection for various characters. Craddock reported that the *A. sterilis* and *A. fatua* collections are being screened for resistance to crown rust, stem rust, etc. He requested help from oat workers in establishing priorities on the screening to be done. Attempts are being made to computerize information on oat collections for international use. Elite sub-collections are being established according to major characteristics, e.g. a winter-hardy group.

At this point Chairman Murphy announced that he had appointed two committees. Briggle and Frey are to advise him regarding foreign visitors to invite to the next AOWC. Wesenberg, Stuthman, and Schrickel are to serve on a committee to advise Craddock regarding characters to evaluate in the World Collection of Oats.

Briggle reported that an Oat Classification Bulletin by F. A. Coffman is in the galley proof stage.

Schrickel reported on the newly formed Milling Oats Improvement Association which involves six firms. The group will be concerned entirely with the support of oat research, and a rough draft of by-laws has been prepared. The group will next meet on July 7 and view the Minnesota oat nurseries.

Marshall then initiated a discussion on oat research needs by presenting some data on current research effort as reflected by CRIS data. He also presented some oat crop value data as compiled by the Crop Reporting Service and Agricultural Census. A lengthy discussion ensued to the effect that such statistics, commonly used by agricultural economists and statisticians, do not accurately reflect the true value of oats because values for straw, for forage, for use on marginal land, etc. are not included. Frey pointed out the intrinsic value of oats for its protein, oil, and straw components. Also, oats is basically a one-half season crop.

There was considerable discussion to the effect that oats fill certain needs in cropping systems, is the most nutritious cereal food crop, etc. Various participants expressed the opinion that ARS has a responsibility to maintain an effective level of research on minor crops and oats is rapidly becoming a minor crop.

There was general agreement by the group that oats generally is a poorly managed crop and production tends to be well below the potential of the crop.

High priority research needs identified were: (a) physiology of organ development, (b) physiological nature and genetic variability of tolerance to heat, drought, and other environmental stresses, and (c) increased support to characterize genetic variability in the Oat Germ Plasm Collection and to make the Collection more accessible. The group also expressed concern over the loss of the sole ARS oat cytologist (Iowa) and a part time ARS oat pathologist (North Carolina) during recent years.

As a finale to the two day meeting, the group met with Mr. T. W. Edminster, Administrator, ARS; Dr. T. S. Ronningen, Associate Administrator, CSRS; Dr. Clarence Grogan, Principal Agronomist, CSRS; and H. O. Graumann, Assistant Administrator for Plant and Entomological Sciences, NPS. Nearly two hours of discussion ensued concerning oat research needs as previously identified by the group, and the problems associated with ARS and CSRS funding to meet such needs.

Respectfully submitted,
Harold G. Marshall
Harold G. Marshall, Secretary

The American Oat Conference Charter

Vernon D. Burrows, Harold G. Marshall and John Grafius were appointed as a committee to draft a new American Oat Conference Charter. We present our draft for your perusal in the hopes that it or a modified version will be approved at our next meeting.

A number of persons have contributed to the proposed charter including Marr D. Simons and Charles F. Murphy and to them we give our thanks.

Respectfully yours,

Vernon D. Burrows

John E. Grafius

Harold G. Marshall

## A Statement of the Purpose and Organization of the American Oat Workers Conference

This statement shall serve to delineate the purpose and organizational structure of an American Oat Workers Conference. This Conference shall be made up of scientists and other workers actively engaged in the improvement, management, and utilization of oats. These requirements being met, active participation in the Conference constitutes membership, and all attending members at a particular meeting of the Conference shall have voice and vote in all matters properly brought before the Conference during a regular business meeting to be held during each meeting of the Conference. The Conference shall meet at a time, generally every four years, and at a location to be selected by vote of the attending membership at the previous meeting of the Conference. The Executive Committee, described below, shall have the authority to call emergency meetings of the Conference as necessary.

The purpose of the American Oat Workers Conference shall be to advance oat improvement and culture in North America and the World by providing a vehicle for:

1. the dissemination of information on current research
2. the discussion of regional and continental problems of oat improvement and integration of applicable research
3. encouraging the exchange and preservation of germplasm
4. standardization of data recording and terminology
5. planning regional and continental performance nurseries as appropriate
6. preliminary announcements of planned cultivar releases
7. action on other matters that may properly come before the Conference

### Organization

American Oat Workers Conference Committee. The American Oat Workers Conference shall be under the general leadership of an American Oat Workers Conference Committee composed of official representatives of the various regions and countries and of a general Executive Committee. Members of the Executive Committee shall be the Chairman, Past Chairman, and Secretary of the American Oat Workers Conference and the Editor of the Oat Newsletter, and they need not be official representatives of the American Oat Workers Conference Committee. The Executive Committee shall appoint a nominating committee for a slate of officers for the offices of Chairman and Secretary of the Conference. The Chairman and Secretary shall be elected by the membership of the Conference during the regular business meeting to be held each time the Conference meets. The term of office shall be four years and the Chairman and Secretary will assume their duties immediately after adjournment of the Conference wherein elected. These officers may serve consecutive terms if properly elected by the Conference. The Editor of the Oat Newsletter shall be nominated jointly by the Executive Committee and the American Oat Workers Conference Committee, and his appointment shall be approved by a majority of the membership of the Conference during the regular business meeting. The Editor of the Oat Newsletter may serve consecutive terms. It shall be the responsibility of the two governing committees to appoint an Acting Editor of the Oat Newsletter should that position be vacated between regular Conference meetings. The Past Chairman, Secretary, and Editor of the Newsletter shall be non-voting members

of the American Oat Workers Conference Committee unless they are also serving as representatives on the American Oat Workers Conference Committee. The Chairman shall be a voting member of the latter Committee and shall preside over all business meetings of the Committee and of the American Oat Workers Conference.

The American Oat Workers Conference Committee shall be made up of official representatives from the various countries and regions as follows:

| | Country and number of representatives | | |
|---|---|---|---|
| Region or Agency | USA | Canada | Mexico |
| Northeastern Region | 1 | 1 | - |
| North Central Region | 1 | - | - |
| Western Region | 1 | 1 | - |
| Southern Region | 1 | - | 1 |
| Federal Dept. of Agric. Advisor | 1 | 1 | - |

Where the representative cannot attend an official conference, he may designate an alternate.

In addition to the above minimum representation, three representatives shall be elected at large by the Conference during the regular meeting once every four years. Also, the elected chairman of the Conference will be a member of the Committee. Thus, the total voting membership of the committee shall not exceed 13. Representatives from the various regions shall be selected by one of the following methods:

1. U.S.A. regional representatives normally shall be elected by the appropriate Regional Committee. In the event no such committee exists, the Secretary of the Conference shall contact oat workers within the region by mail once every four years and solicit nominations for a representative and subsequently conduct an election by mail ballot. The individual receiving the most votes shall serve as representative.

2. Canadian regional representatives shall be elected by the Subcommittee on Oats of the Canada Committee on Grain Breeding. This same Subcommittee will have the option of electing the third representative to fill the designated Federal position or of requesting Federal representation; whichever is more appropriate.

3. The representative from the U. S. Department of Agriculture shall be the national technical advisor for oat improvement.

4. The Mexican representative shall be designated by the appropriate government official or organization.

Alternates should be elected or appointed for each representative on the American Oat Workers Conference Committee.

Standing Committees. There shall be standing committees of the American Oat Workers Conference as follows:

1. Committee on Nomenclature and Cataloging of Oat Genes. This committee shall consist of three conference members appointed by the chairman of the American Oat Workers Conference. It shall serve to assign symbols and catalog new genes governing characters in oats. Such genes will be listed and described in the Oat Newsletter on an annual basis. The committee will also be responsible for considering periodical up-dating and revision of the original publication on the subject, which was entitled "A Standardized System of Nomenclature for Genes Governing Characters of Oats." There shall be no limit of office of committee members.

2. Nomination Committee for Distinguished Service to Oat Improvement Award. This committee shall consist of three Conference members appointed by the Chairman of the American Oat Workers Conference and shall include at least two members who have served on the American Oat Workers Conference Committee. Their term of office shall be from date of appointment until the end of the following Conference meeting.

## Oat Newsletter

The American Oat Workers Conference shall sponsor an Oat Newsletter to be published on an annual basis for the purpose of dissemination of information on current oat research and research needs. Members of the Conference are encouraged to submit information about their current research programs in response to an annual written request to be made by the Editor of the Oat Newsletter. The Newsletter shall also serve as a vehicle of publication for the minutes of the business meetings of the Conference and of the American Oat Workers Conference Committee as well as for committee reports and other Conference notes. Abstracts of papers presented at meetings of the Conference also shall be published in the appropriate issues of the Newsletter.

Contributions from countries outside the Conference will be accepted for inclusion in the Newsletter, and should be encouraged so as to promote the dissemination of oat research information and news.

The Oat Newsletter shall be distributed to all members of the Conference and upon request, to other interested oat and cereal crops workers outside the American Oat Workers Conference. The Editor of the Newsletter shall maintain a mailing list for this purpose and publish it in each Oat Newsletter.

## Distinguished Service to Oat Improvement Award

The American Oat Workers Conference shall confer the award of "Distinguished Service to Oat Improvement Award" upon persons in recognition of their outstanding research contributions and/or meritorious service toward making oats a successful agricultural species. The recipient(s) of this award shall be nominated by the Committee previously described as having this charge, and they shall be elected for the award by a majority vote of the American Oat Workers Conference Committee. No restriction shall be placed upon whom may

receive the award. However, as a general guide, the award should be presented to persons who have devoted a significant portion of their professional career and a significant number of years working with oats through research, extension, or other professional activities. The number of recipients should not be limited, but in general, not more than one to three persons would be recognized at one Conference meeting.

The award shall be conferred at a regular meeting of the American Oat Workers Conference. Manifestation of the award shall be denoted by the presentation of a suitable plaque or certificate to the recipient. A brief (not to exceed two typewritten pages) statement about the recipient and a photograph of the recipient shall be printed in the first volume of the Oat Newsletter after the presentation.

Utilization and Quality

## Value of the 1975 U.S. Oats Crop

Donald J. Schrickel
The Quaker Oats Company

In April of 1976, the American Oats Workers Conference Committee was held at Beltsville, Maryland. At this meeting, Dr. H. G. Marshall presented information on the crop value of oats for the 1975 crop, which was based entirely on grain value. A discussion followed which called attention to the fact that in order to properly evaluate the oats crop, one should also consider the acres which are harvested as forage (hay, silage, or green-chop) or pasture, and the value of straw. A member of the Economic Research Service, USDA was present -- Mr. E. G. Strand. He stated that he has a study underway to properly assess the total value of the oats crop but would not be in a position to furnish any values in the immediate future. Therefore, Don Schrickel of The Quaker Oats Company agreed to furnish a report on a state by state basis of the 1975 US oats crop for all uses.

This report was prepared and distributed to numerous plant breeders and others interested, but it is too lengthy to include in the Oats Newsletter. Copies of this report are available from:

Don Schrickel
The Quaker Oats Company
345 Merchandise Mart Plaza
Chicago, IL 60654

In summary, the report states the following:

| Use of the Crop | Value |
|---|---|
| Grain | $ 940,244,000 |
| Straw | 269,411,000 |
| Forage (Hay, Silage, Green-Chop) | 89,116,000 |
| Pasture | 255,543,000 |
| Total | $1,554,314.000 |

The report was prepared on May 19, 1976 and since then several adjustments have been made on advice of persons receiving the report, such as increasing the amount shown for forage in their state and decreasing the amount for pasture or vice versa.

As of January 10, 1977, the Economic Research Service has not published their report.

Oat Quality Laboratory
USDA, ARS

V. L. Youngs and K. D. Gilchrist

Between July 1, 1975 and June 30, 1976, 24,425 oat groat samples were analyzed for protein concentration. These samples were received from Arkansas, Georgia, Iowa, Idaho, Indiana, Minnesota, Missouri, North Carolina, Pennsylvania, South Dakota and Wisconsin. The Kjeldahl procedure was used on 596 samples, and the remainder were analyzed by dye-binding. Between July 1, 1976 and January 20, 1977, protein data on 15,408 samples were returned to oat workers. On January 20, approximately 15,500 samples were in storage, waiting for analysis.

U.S. Grain Marketing Research Center
ARS, USDA, Manhattan, KS
and Barley and Malt Laboratory
ARS, USDA, Madison, WI

Y. Pomeranz and G. S. Robbins

Protein content and amino acid composition were determined in groats and hulls of three oat cultivars harvested at four stages of development. Protein content was slightly higher in mature than in immature groats. In the hulls, protein content decreased during development to about one-third the content of immature hulls. The large decrease in protein content of the hulls was accompanied by little change in amino acid composition. In the groats, however, there were consistent and large decreases in concentrations of lysine, threonine and aspartic acid and an increase in glutamic acid. The results suggest that in addition to deposition of storage protein in the groat, amino acids are translocated from the hulls to the groats.

Structure of cereal grains is important in relation to physiological function, processing and utilization, and storage. A clear understanding of the structural details is therefore of interest to plant breeders, plant pathologists, cereal chemists, and food processors. Two reviews, listed below, were published in the past year on the use of scanning electron microscopy in determining the structure of cereal grains (including oats) as it relates to grain structure, composition, processing, storage, and utilization.

Pomeranz, Y. 1976. Scanning electron microscopic applications to cereal science and technology. pp. 193-234. In: Principles and Techniques of Scanning Electron Microscopy. Biological Applications. Vol. 5. ed. by M. A. Hayat. Van Nostrand, Reinhold Co., New York.

Pomeranz, Y. 1976. Scanning electron microscopy in food science and technology. Adv. Food Res. 22:205-307.

## Utilization of Oats in Bread Baking

Bert L. D'Appolonia and V. L. Youngs

This study is a joint effort between Dr. V. L. Youngs of the Oat Quality Lab, USDA, ARS, Madison, Wisconsin and the Department of Cereal Chemistry and Technology, North Dakota State University.

The utilization of different oat fractions including the bran, water-solubles and a high protein concentrate isolated from oats on physical dough and baking properties was undertaken. Protein content of the high protein fraction was 50.0%. Incorporation of the high protein fraction or the oatmeal bran up to the 30% level increased farinograph absorption. The dough development time decreased to a greater extent with the incorporation of the high protein containing fraction than the bran. Incorporation of the oatmeal bran reduced loaf volume of the bread to a lesser degree than the use of the high protein fraction at the same level. The use of oat bran caused a greater reduction in loaf volume than incorporation of wheat bran. Incorporation of the high protein fraction or oatmeal bran at the 10% level increased the nitrogen content of the bread crumb from 2.49% to 3.00% and 2.61% respectively. Taste panel evaluations with 5 and 10% levels of incorporation of the high protein concentrate or oatmeal bran were favorable.

## Protein Distribution Within Oat Kernels of Single Cultivars that Differ in Protein Concentration (Summary)

V. L. Youngs and K. D. Gilchrist

Two sets of oat samples were used that showed considerable difference in protein concentration within a cultivar. In one set, a single cultivar was grown at a single location, and the protein range was created by different levels of fertilization. In the other set, seven cultivars were grown at two locations which also produced different protein levels within each cultivar. The seeds were dehulled and separated into the germ, bran, and starchy endosperm. Nitrogen analysis was performed on each part. Average protein concentrations (N x 6.25) of the groats and groat parts are shown in the following table.

TABLE 1

Protein Distribution and Average Protein Difference within Single Cultivars having Different Protein Concentration[a]

| Sample | Fertilizer Study ("Nora")[b] | | | Environmental Study[c] | | |
|---|---|---|---|---|---|---|
| | Protein % Average Low | Protein % Average High | Difference Percentage Points | Protein % Average Low | Protein % Average High | Difference Percentage Points |
| Groats | 13.0 | 15.4 | 2.4 | 16.9 | 19.9 | 3.0 |
| Germ | 33.6 | 35.2 | 1.6 | 32.9 | 33.5 | 0.6 |
| Bran | 15.3 | 17.8 | 2.5 | 22.0 | 24.8 | 2.8 |
| Endosperm | 9.5 | 10.8 | 1.3 | 13.8 | 16.1 | 2.3 |

[a]Protein values are expressed on a moisture-free basis.
[b]Eight pairs of samples.
[c]Seven cultivars, each grown at two locations.

In general, protein concentration increased more in the bran than in the endosperm. With the renewed interest in cereal brans as a source of dietary fiber, oat bran would be a good source of both protein and fiber.

Agronomy

## Looking for Something Different in Oat Parents?

P. G. Rothman

Variations observed within the progeny lines of a colchicine-derived synthetic hexaploid oat, the result of an interspecific cross of Avena magna (4x) and A. longiglumis (see 1975 Oat Newsletter, page 39), suggest that germplasm of these two wild oat species could prove useful in breeding elite oat cultivars. The synthetic hexaploid line, dubbed Amagalon, appears to be a blend of morphological characteristics of the two species. While the line evolved from a single seed obtained on a colchicine-treated tiller of the interspecific $F_1$ hybrid, variations now exist is some progeny lines in the $C_5$ generation. Fertility generally is low. Some lines appear to be increasing in fertility, while others are occasionally still lost due to sterility. The typical spikelet has the long narrow shape of A. longiglumis but is more robust in size than A. magna, exceeding it in length as much as 25%.

The fertile anthers of Amagalon are long, resembling those of A. longiglumis, and often attain 10 mm in length. Pollen from such a single anther can bury the stigmas of emasculated florets of lines in a crossing program, probably accounting for the ease of obtaining crosses between Amagalon and other hexaploid species. Such hybrids, however, are usually sterile. Two exceptions have been found. Partially fertile hybrids have been obtained with the hexaploid cultivars Minhafer and Black Mesdag used as either the female or male parents.

In some Amagalon lines the leaf sheath pubescence exceeds that of the pubescent A. longiglumis parent, while lines as glabrous as A. magna are also found. Lines without awns and glume pubescence are occasionally found. From my own experience, as well as observations by three individuals who had watered for me in the greenhouse, the Amagalon lines require less frequent watering, about half as much as the other oats of comparable size in the same greenhouse. Because A. longiglumis is ecologically adapted for growth in extremely sandy soil, these lines could be useful in breeding for drought resistance.

Among other significant characteristics of the Amagalon lines, those for dormancy and maturity are most variable. Some seed germinate immediately upon falling from the plants, while others have extended dormant periods. Early lines are few in number, as most lines are very late, many never reaching the heading stage in our field nursery at St. Paul, Minnesota. Protein analysis by the Oat Quality Lab at Madison, Wisconsin on a bulked Amagalon line indicated a crude protein content of 32.9%, while that of an $F_5$ line of Amagalon/Minhafer was 28.9%. Some Amagalon lines have seedling and adult resistance to stem rust races 31, 87, and 94, and others are resistant to all the crown rust races disseminated from our buckthorn hedges. Combined crown and stem rust resistance has been found in a single line. Crown rust resistant lines were found in early generation progenies of the cross between Amagalon and Minhafer, but all lines tested for stem rust were susceptible. No rust resistance has yet been found among the progeny of Amagalon/Black Mesdag.

Some seed is available for distribution to breeders interested in any of these characteristics.

## Record Oat Yields in Northern Alberta 1976

D. G. Faris

Growing conditions in 1976 were so favourable at the Agriculture Canada Research Station at Beaverlodge in northern Alberta (55°N) that two oat lines yielded more than 200 bu/ac (Table 1), a new record for the station. The two lines (OT 729 and OT 726), from a Random X Forward cross, were selected at the Agriculture Canada Research Station at Lacombe, Alberta. Using the 32 lb bushel, their yields were equivalent to about 217 and 214 bu/ac respectively. All the lines in Table 1 showed lodging resistance. Random is the most widely grown oat variety in northern Alberta.

Table 1: Performance of Oats at the Research Station, Beaverlodge 1976

| Cultivar or Line | Seed Yield kg/ha | bu/ac (at 34 lb/bu) | Days to Ripe |
|---|---|---|---|
| Western Canada Co-op Test | | | |
| OT 729 | 7772 | 204 | 126.5 |
| OT 726 | 7673 | 201 | 121.0 |
| Leanda | 7028 | 184 | 120.2 |
| Random | 6955 | 183 | 122.7 |
| OT 725 | 6884 | 181 | 117.0 |
| Introduction Nursery | | | |
| Maris Tabard | 7535 | 198 | 128.7 |
| Selma | 7207 | 189 | 129.5 |
| Tarpan | 7204 | 189 | 124.7 |
| Random | 7088 | 186 | 122.5 |
| Leanda | 6971 | 183 | 125.7 |
| Western Canada Co-op 1971-1975 | | | |
| Random | 4310 | 113 | 97.8[1] |

[1]Mean 1967-70 and 1975.

For comparison, the average yield of Random at Beaverlodge over the previous 5 years was just over 60% of its yield in 1976 (Table 1). On the other hand, Random took over 3 weeks longer to mature in 1976 than the average of five previous years. The average farmer's yield for the period (1971-1975) on the approximate 200,000 acres of oats grown in northern Alberta was about 52 bu/ac compared to an estimated record high of over 59 bu/ac in 1976.

In general, the high yielding cultivars from Europe grown in the Introduction Nursery (Table 1) tended to be late for northern Alberta. In northern Alberta each day of earlier maturity reduces the risk of raising oats because the growing season in the region frequently limits growth. The potential of oat lines developed in Alberta to produce high yields in a limited time is illustrated (Table 1) by OT 726, mentioned earlier, and OT 725 (OA123-3 X Pendek) also from Lacombe.

# Multicut Oats in India (Haryana Javi-114)

R. S. Paroda, K. R. Solanki and B. S. Chaudhary
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Hissar-125004, India

Among rabi crops, oat is considered to be a very nutritive forage cereal. It is grown generally in areas with limited irrigation facilities. So far, the approved varieties of oat are mainly suited to single cut programme. In view of the fact that farmers are interested in longer duration for the availability of good quality green forage, particularly in water scarcity areas, it is necessary to have variety particularly suitable for multicuts. Variety Haryana Javi-114 has been bred to meet this objective (1). It has excelled both in green and dry matter yield in single cut as well as multicut trials conducted at the Haryana Agricultural University, Hissar, and also in all India Coordinated Trials on Oat. Considering the performance of this variety, it has been recommended for general cultivation, both for multicut as well as singlecut, in all oat growing regions of India by the All India Workshop on "Forage Production and its Utilization" held at Jhansi (U.P.) in January, 1973. Also, it was released for general cultivation in Haryana by the State Variety Release Committee in January, 1974 and subsequently notified by the State Seed-Sub Committee in May, 1975.

The new variety Haryana Javi-114 is a selection for improved regeneration from the line 37/14 being maintained in the genetic stock and is especially suited for multicut. It has shown its superiority over Weston-11, on approved variety of the state in multicut trials conducted during last four years as it gave 21.0% higher green fodder yield and 43.0% higher dry matter yield. Also it gave 3.97% higher green fodder yield and 12.49% higher dry matter yield over Weston-11 in single cut. This variety has also given 26.0% higher green fodder yield and 48.0% higher dry matter yield in multicut and 9.14% higher green fodder yield and 8.15% higher dry matter yield in single cut over another approved late variety FOS 1/29. Haryana Javi-114 is quite early and it produces maximum green fodder per hectare per day (6.0 q/ha). The seed size is very bold and it produces about 25 q/ha of grain yield which is 40% higher than Weston-11. It is also quite tall and resistant to lodging and diseases under field conditions.

Table 1. Comparison of Haryana Javi-114 with check varieties.

| Characters | Haryana Javi-114 | Weston-11 | FOS 1/29 |
|---|---|---|---|
| Days to 50% flowering | 104 | 111 | 129 |
| Multicut | | | |
| (a) Green fodder yield (q/ha) | 611 | 504 | 484 |
| (b) Dry matter yield (q/ha) | 129 | 89 | 86 |
| Singlecut | | | |
| (a) Green fodder yield (q/ha) | 452 | 411 | 414 |
| (b) Dry matter yield (q/ha) | 107 | 95 | 99 |
| Seed yield (q/ha) | | | |
| Protein | | | |
| (a) Percentage | 7 | 6 | 4 |
| (b) (q/ha) | 16 | 7 | 8 |
| IVDMD (Percentage) | 61 | 65 | 61 |

# Variability in Oat Rusts in Eastern Australia

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University of Sydney
Plant Breeding Institute
New South Wales, Australia

Due to a renewed interest in oat breeding, a survey of oat crown rust in Eastern Australia was commenced in 1975. Crown rust is a significant disease of coastal oat crops of New South Wales and Queensland; such crops are used on dairy farms for grazing during winter and spring.

The survey during the 1975-76 season handled 98 collections and made 144 isolations of 13 different physiologic races using the international set of differentials. The cultivars Klein 69B and Ruakura were used to further differentiate the races.

The 1976-77 survey has so far (mid January) handled 136 collections and made 217 isolations of 11 different physiologic races. To the above differentials we have added Ascencao and five isogenic lines carrying Pc 38, Pc 39, Pc 45, Pc 48 and Pc 50.

The 1976 survey was aided by a number of differential nurserys growing through the rust liable area. This improved selection technique may account for some of the differences of the two seasons collections. Care was taken when compiling the figures to delete duplications of races identified from samples taken more than once from the same row and site.

In view of the near absence of resistance in the currently grown oat cultivars in Australia the range of virulence found is surprising. The only recognized resistant cultivar grown to any extent has been the Sand Oat 'Saia' (*A. strigosa*). Some of the variability could have had its origin in attempts by breeders to introduce resistance from the differential cultivars, in particular Bond, Victoria and Santa Fe. The prevalence of moderately and highly virulent races (see Table 2) in the absence of obvious selection pressure casts doubt on the value of such resistances even when in combination.

Throughout Eastern Australia cultivated oat crops can be found from January through to November; two wild oat species *A. fatua* and *A. ludoviciana* grow throughout the cereal belt. We believe that volunteer or self-sown oats and wild oats in particular, enable the persistance of the fungus from one season to the next. In addition, wild oats has been shown to vary genetically in regard to some putative hybrid rust stains. It is therefore not unreasonable to suggest that the preponderance of strains virulent on at least three oat crown rust differentials has been influenced by wild oats.

The isogenic lines carrying Pc 55 and Pc 56 have been shown as resistant under limited testing, they will be added to the survey set for the 1977-78 season commencing April 1.

The current breeding aim is to utilize the resistant Pc genes (Table 1) and promising I.O.R.N. lines in otherwise acceptable agronomic backgrounds such that any new variety will possess at least 2 sources of resistance.

The paper reporting on variability of oat stem rust in Eastern Australia was published in 1973. Of the genes present in the oat stem rust differential set, pg 8 is still effective against all isolates tested. Further cultures closely related to *P. graminis avenae* but avirulent on cultivars of wheat, oats and rye have been recovered from grasses.

Table 1. Percentage of Isolates Virulent on the International, Local, and Pc Differentials in Eastern Australia.

| | Season | | | Season | |
|---|---|---|---|---|---|
| | 1975-76 | 1976 | | 1975-76 | 1976 |
| Anthony | 99.3 | 100 | Saia | 36.1 | 29.3 |
| Victoria | 5.6 | 14.3 | Klein 69B | 36.8 | 37.7 |
| Appler | 100 | 100 | Ruakura | 77.1 | 83.8 |
| Bond | 11.8 | 36.9 | Ascencao | - | 0 |
| Landhafer | 22.9 | 38.7 | Pc 38 | - | 40.0 |
| Santa Fe | 22.9 | 38.7 | 39 | - | 0 |
| Ukraine | 50.7 | 70.1 | 45 | - | 0 |
| Trispernia | 22.9 | 38.7 | 48 | - | 0 |
| Bondvic | 22.9 | 38.7 | 50 | - | 0 |

Table 2. Frequency of Occurrence of Physiologic Races of Oat Crown Rust in Eastern Australia.

| Race | 1975-76 | | 1976 | | No. of Susceptible |
|---|---|---|---|---|---|
| | Total | % | Total | % | Inter. Differentials |
| 203 | - | - | 1 | 0.5 | 4 |
| 216 | - | - | 1 | 0.5 | 5 |
| 226 | 25 | 17.4 | 41 | 18.9 | 3 |
| 227 | 28 | 19.4 | 44 | 20.3 | 4 |
| 230 | 1 | 0.7 | - | - | 2 |
| 233 | 2 | 1.4 | - | - | 3 |
| 236 | 24 | 16.7 | 20 | 9.2 | 3 |
| 237 | 27 | 18.7 | 26 | 12.0 | 2 |
| 238 | 2 | 1.4 | - | - | 1 |
| 259 | 2 | 1.4 | - | - | 4 |
| 263 | 14 | 9.7 | 18 | 8.3 | 7 |
| 264 | 6 | 4.2 | 30 | 13.8 | 9 |
| 276 | 9 | 6.2 | 30 | 13.8 | 8 |
| 277 | 2 | 1.4 | 1 | 0.5 | 6 |
| 286 | 2 | 1.4 | 5 | 2.3 | 7 |

Pathology

## Yield losses caused by *Septoria avenae*

G. Frimmel
Nordsaat GmbH, Waterneverstorf, West Germany

The fungus causes brownish spots on the leaves and on the leaf sheath. From there the stalk can be attacked with the consequence that the straw breaks. This disease rather regulary occurs in Germany, especially in the northern part, but little attention was payed to it up to now. However, investigations with artificial infections carried out by the Biolog. Bundesanstalt in Kiel showed a reduction of the number of kernels per panicle and a reduction of the kernel weight, resulting in yield losses of 30-40%.

We have observed the natural attack of *Septoria avenae* on our experimental field for several years. No high degree of resistance was seen among the varieties and breeding strains observed, but nevertheless, differences in the degree of the attack could be confirmed by observations over three years. To get an impression of the yield losses under natural conditions, numerical values were assigned to corresponding degrees of disease severity (1 = 0, 9 = heavy) and correlations between these values and yield data were computed. The results of the last year's observations were, for two trials, $r = -0.61$ ($n = 49$) and $r = -0.60$ ($n = 36$). The regression coefficients indicated yield losses of 6% and 7% for each unit of the numerical scale of disease severity.

Though lodging is no problem in small plots, it is a serious matter for practical farming. Therefore also correlations of data for straw breaking (1 = 0, 9 = severe) and Septoria severity were computed for trials where enough differentiation was observed. The results were: $r = 0.29$ ($n = 49$), $r = 0.39$ ( $n = 36$) and $r = 0.23$ ($n = 257$, plots without replications). Straw strength is primarily dependent on the anatomical architecture of the stalk. However, some influence of the fungus was evident. This relationship was much weaker than the relationship between yield and disease attack, indicating that lodging was not the only cause for the yield reduction.

Major genes for resistance are not known, but the observed variation of varietal response to the attack should make it possible to increase resistance by combining genes with minor effects. Of the tested varieties, the swedish oat Selma was least diseased.

# Crown and Stem Rust of Oats in 1976

A. P. Roelfs, P. G. Rothman, D. L. Long, and D. H. Casper

Oat crown rust -- In commercial fields along the Gulf Coast, crown rust was the lightest in years. However, in experimental plots in Alabama and Texas severities ranged from 20-80% on some cultivars. Much of the commercial acreage in south Texas was planted with the crown rust resistant varieties Coker 234, TAM-0-301, and TAM-0-312. Crown rust was nearly non-existent in north-central Texas fields in early May.

Aecia appeared on buckthorn in Dane and Rock Counties, Wisconsin and in the buckthorn nursery at St. Paul, Minnesota by the third week in May. Abnormally dry conditions retarded rust spread to surrounding oat fields. Traces of crown rust were present in the area from Kansas to Ohio by mid-June and extended into Pennsylvania fields by early July. In early August only traces of crown rust were observed in the major oat production area of Iowa, Minnesota, Wisconsin, and the Dakotas. Terminal crown rust severities varied in this area from a trace to 3%. This was the lightest it has been in recent years because of the extended drought which prevented disease development. Losses due to crown rust were light throughout the southern U.S. except for a few isolated fields.

Oat stem rust -- In early April oat stem rust was observed in the Beeville, Texas nursery and in the border of a commercial irrigated grazing field in Frio Co., Texas. By late May stem rust had spread into north-central Texas and many collections from susceptible varieties were made in Bee, Brazos, and Collins Counties in Texas. By early June stem rust was found in Bexar and Denton Counties, Texas; Grant Co., Oklahoma; and Iowa. Scattered stem rust was present in central Kansas and southeastern Nebraska by mid-June.

By early July oat stem rust had occurred in southern Minnesota. With above-average temperatures, stem rust spread faster in the inoculated nursery at St. Paul, Minnesota than crown rust. Stem rust losses in the north-central states were light because of a low level of initial infection, early planting, and an abnormally dry season. Severities of up to 20% were observed in scattered fields in southern Minnesota where moisture was more readily available.

Oat stem rust spread from barberry was reported this year on June 8 in the Uniform Rust Nursery in Centre Co., Pennsylvania. This nursery is associated with a planting of barberry bushes; thus races 87 and 94 that readily produce teliospores dominated, as has been common in previous years.

The principal physiologic races identified from uredial collections in the United States were 31 and 61 (Table 1). A change observed in the race survey was the decrease in the prevalence of race 61 in south Texas, where it was the major component last year. The erratic distribution of the infrequently identified races was probably due to inadequate sampling. Seedling resistance to races 31 and 61 is provided by pg-9 and pg-13. The seedling resistance of CI 9221, CI 9139, CI 8457, Kyto, and Saia were effective against all 1976 cultures tested.

Table 1. Physiologic races identified from uredial collections analyzed in the 1976 oat stem rust race survey.

| State | Collection source | Number of Coll. | Number of Iso. | Percentage of isolates of race 1 | 2 | 7 | 8 | 31 | 61 | 76 | 77 | 78 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| California | Nursery | 1 | 3 | | | | 100 | | | | | |
| Indiana | Nursery | 9 | 24 | | | | | 91 | 9 | | | |
| Iowa | Field | 14 | 42 | | | | | 95 | 5 | | | |
| | Nursery | 3 | 9 | | | | | 100 | | | | |
| Kansas | Field | 6 | 18 | | | | | 56 | 44 | | | |
| Minnesota | Field | 74 | 211 | | | | | 92 | 8 | | | |
| | Nursery | 27 | 75 | | | | | 71 | 29 | | | |
| | Wild oats | 10 | 25 | | | | | 60 | 40 | | | |
| Montana | Nursery | 2 | 4 | | | | | 25 | 75 | | | |
| Nebraska | Field | 5 | 15 | | | | | 80 | 20 | | | |
| North Dakota | Field | 10 | 27 | | | | | 60 | 40 | | | |
| | Wild oats | 39 | 106 | | | | | 34 | 66 | | | |
| Oklahoma | Field | 1 | 3 | | | | | | 100 | | | |
| | Nursery | 1 | 3 | | | | | | 100 | | | |
| Pennsylvania | Field | 2 | 3 | | | | | 100 | | | | |
| South Carolina | Nursery | 2 | 6 | 17 | | | | | 83 | | | |
| South Dakota | Nursery | 6 | 14 | | | | | 66 | 33 | | | |
| Texas | Field | 4 | 12 | | | | | 75 | 25 | | | |
| | Nursery | 103 | 288 | 7 | 7 | 1 | | 45 | 36 | 1 | 2 | 1 |
| | Wild oats | 1 | 3 | | | | | 100 | | | | |
| Wisconsin | Field | 33 | 96 | | | | | 100 | | | | |
| | Nursery | 4 | 11 | | | | | 91 | 9 | | | |
| U.S.A. | Field | 149 | 427 | | | | | 89 | 11 | | | |
| | Nursery | 158 | 437 | 5 | 5 | 1 | 1 | 53 | 33 | * | 1 | * |
| | Wild oats | 50 | 134 | | | | | 40 | 60 | | | |
| Total | | 357 | 998 | 2 | 2 | * | * | 67 | 27 | * | * | * |

* Less than 0.6%.

# OAT SMUT IN WISCONSIN

D. C. Arny

The Wisconsin Department of Agriculture, in its 1976 survey of oat diseases, found smut in 38 of the 70 fields observed with 15 percent in one field. Most had less than 5 percent and the overall average was 1 percent. Smut was also found in several certified seed fields.

We reported the reactions of several varieties in the 1975 ONL and in PLANT DISEASE REPORTER 60:539-541. A summary of somewhat broader testing is as follows:

| Variety | Years tested | Percent smut[a] Old | New | Variety | Years tested | Percent smut[a] Old | New |
|---|---|---|---|---|---|---|---|
| Ajax | 1 | 37 | 27 | Mariner | 1 | 6 | 13 |
| Allen | 3 | 35 | 32 | Menominee | 2 | 59 | 38 |
| Bates | 1 | 0 | 0 | M73 | 2 | 27 | 37 |
| Beedee | 5 | Tr | 50 | Mn 71101 | 3 | 0 | 8 |
| Chief | 4 | 7 | 16 | Mn 71211 | 3 | 10 | 7 |
| Clintland 64 | 4 | 5 | 8 | Mn 73231 | 2 | 0 | 7 |
| Dal | 4 | 0 | 9 | Noble | 3 | 0 | Tr |
| Froker | 5 | 7 | 20 | Orbit | 4 | Tr | 50 |
| Garland | 3 | 10 | 4 | Otee | 2 | 18 | 25 |
| Garry | 2 | Tr | 29 | Otter | 2 | 1 | 38 |
| Gemini | 1 | 0 | 54 | Portal | 3 | 11 | 18 |
| Goodland | 3 | 1 | Tr | Rodney | 1 | 3 | 40 |
| Gopher | 3 | 58 | 42 | Scott | 2 | 1 | 12 |
| Holden | 5 | 2 | 6 | Spear | 4 | 2 | 4 |
| Hudson | 4 | Tr | 44 | Stout | 3 | 29 | 16 |
| Jaycee | 5 | Tr | 1 | States Pride | 2 | 70 | 52 |
| Korwood | 3 | 70 | 55 | Vanguard | 1 | 75 | 83 |
| Lang | 3 | Tr | 25 | Victoria | 2 | 0 | 45 |
| Lodi | 5 | 2 | 46 | Wright | 3 | Tr | 28 |
| Mackinaw | 3 | 3 | 6 | | | | |

[a]0-5=R, 6-15=MR, 16-30=MS, >30=S.

The development of resistant varieties is obviously the best answer, but where a problem develops in a susceptible variety, seed treatment with Vitavax could be a solution. Results from a 1976 trial with Lodi are as follows:

| Treatment[a] | Oz. Cwt. | Percent smut Inoculated | Natural |
|---|---|---|---|
| None | | 47 | 4 |
| Vitavax 200 37.5-37.5 WP | 2 | 0 | Tr |
| Vitavax 34 Fl | 2 | 2 | 0 |
| Vitavax Fl | 3 | 0 | 0 |
| Vitavax 75 WP | 2 | Tr | 0 |
| Dithane M45 80 WP | 2 | 32 | 1 |
| Thiram 75 WP | 2 | 59 | 2 |
| Captan 80 WP | 2 | 54 | 3 |

[a]WP=wettable powder, Fl=Flowable.

# III. CONTRIBUTIONS FROM UNITED STATES, CANADA, AND OTHER COUNTRIES

## Western Canada

J.W. Martens, D.E. Harder, R.I.H. McKenzie, C.C. Gill,
A. Comeau[1/] J.J. Nielsen and P.D. Brown

About 5,600,000 acres of oats were sown in the three prairie provinces in 1976 and about 4,900,000 harvested. Yields were 58.9, 55.7 and 48.8 bushels/acre in Alberta, Saskatchewan and Manitoba, respectively. Very dry weather starting late in June resulted in the lower yields on the eastern Prairies. Diseases had little influence on the yields.

In the Western Cooperative Oat Test grown at Beaverlodge, Alberta, yields of two entries exceeded 200 bushels (34 lb bushel) per acre. This is apparently the first time that yields of over 200 bushels have been reported in dry land tests in Canada. Both entries were from the Lacombe breeding program (see also D.G. Faris' contribution in this newsletter). Otana recently released in Montana was the highest yielding strain in tests conducted across western Canada in 1976.

### Oat Stem Rust

Stem rust of oats was first found in Manitoba in mid-July. By mid-August light infections occurred through Manitoba and a large part of Saskatchewan but disease development was arrested by a very dry summer. There were no crop losses except in small areas in central and eastern Manitoba and in north-eastern Saskatchewan where a few fields developed moderate levels of infection and sustained some losses. Races C10 (U.S. 31) and C23 (U.S. 61) continued to predominate in western Canada and comprised 57% and 39% of all field isolates, respectively. In eastern Canada race C9 (U.S. 87) was the predominant race. Virulence on resistance conferred by gene Pg 13 again occurred in both eastern and western Canada.

### Oat Crown Rust

Oat crown rust infections were light in western Canada in 1976 and caused no significant crop losses. The physiologic race distribution patterns remained relatively unchanged in 1976. As in previous years, resistance conferred by genes Pc 35 and Pc 40 and that conferred by Pc 35 and Pc 56 was the least effective in western and eastern Canada, respectively. Resistance conferred by genes Pc 38, Pc 39 and Pc 55 has remained highly effective although traces of virulence have been observed on these genes.

### Oat Smut

Three new races of covered smut of oats, *Ustilago kolleri*, with virulence on Victoria occur in a low incidence in western Canada. They appear to be related with each other and with the only previously known race of covered smut that is virulent on Victoria. The cultivar Markton, C.I. 2053, is resistant to these races.

1/ Agriculture Canada, Ste. Foy Research Station, Quebec on transfer of work to Winnipeg.

BYDV in Manitoba - 1976

Damage to oat crops from BYDV was minimal except for late-seeded material. Most of the oats were seeded very early and thus escaped the high incidence of infection that occurred on the very small percentage of crops that was seeded late. BYDV was sampled from severely affected oats and barley south of Winnipeg. These isolates all proved to be the aphid non-specific variant, and most caused extreme stunting on the Coast Black oats used in the tests.

Screening of Oats to Barley Yellow Dwarf Virus

A total of 139 entries was screened to three variants of BYDV in field plot trials at Winnipeg in 1976. The variants were aphid non-specific (isolate 7410), Rhopalosiphum padi-specific (isolate 6524), and M. avenae-specific (isolate 6407). Treatments with each virus isolate were replicated twice per entry, and in some tests, two replicates were also run for uninoculated control plots. Four-foot row plots were inoculated at the late tillering stage on June 11 with the R. padi-specific, and M. avenae-specific isolates, and on June 17 with the non-specific isolate. Seed yields per plot were determined at harvest.

In all six tests, yields from inoculated plots, averaged for all entries, were lowest with the non-specific and R. padi-specific isolates, and highest with the M. avenae-specific isolate. Susceptibility varied considerably between oat entries for a given isolate. OA-338 was one of the outstanding oats in these tests. This oat was included in the Western co-op, the Eastern co-op, and the UMSON tests. Yields from plots of OA-338 inoculated with the virulent non-specific isolate were the highest of any entry in two of these tests and second highest in the third. Yields to the other two virus isolates with this line were also good.

In the Western co-op test, New Zealand line M-921 had the highest yield when averaged for all three virus treatments. Five entries from Lacombe, Alberta, rated highly against the M. avenae-specific isolate, but yields were usually progressively lower with the R. padi- and non-specific isolates. Line 364-41 and 364-29 were the best of this group. In the Eastern co-op test, some entries such as Scott, QO 68-7 and QO 69-12 showed specific tolerance to the M. avenae-specific isolate. In the UMSON test, Ill. 73-2664 showed high tolerance to all three isolates, rating top among the entries in this respect. OA-338, however, which overall rated second, was slightly more tolerant to the non-specific isolate than Ill. 73-2664.

In the miscellaneous oat test, at least four entries were highly tolerant to the M. avenae-specific isolate, but for tolerance to the more virulent non-specific and R. padi-specific isolates, RL 606 (originally from Illinois) rated the highest, with a yield to the non-specific isolate of 82% of that of the uninoculated controls.

In the Winnipeg rust area test, three rust-resistant lines, RL 3039, 3040, and 3041 showed resonably good tolerance to the non-specific isolate. These lines, however, were very susceptible to the same non-specific isolate of BYDV when inoculated at the 2-3 leaf stage in a growth cabinet experiment. Random and M 174-1 were highly tolerant in the field test to the M. avenae-specific isolate.

# ARKANSAS

F. C. Collins, J. P. Jones and W. T. McGraw

Production. Oat production in Arkansas during the 1975-76 growing season was higher than the previous year. The increase was due to a larger acreage and a 76 bu/A state yield average. Most of the acreage was planted to Nora, Coker 227, Florida 501, Tam O-312 and Ora. Although the spring drought stressed the plants, test weights were generally high (34 to 38 lbs/bu).

Oat Diseases. Diseases were of little importance in oats during the 1975-1976 season. Barley yellow dwarf virus was sporadically distributed throughout the commercial oat acreage but substantial damage occurred only in fields planted early for fall forage production.

Oat Breeding. We plan to release a selection from the cross between Nora and Florida 501 this spring; tentatively, it will be named 'Bob' in honor of the late Dr. R. L. Thurman who was the oat breeder involved in the release of Ora and Nora. Relatively to Nora in Arkansas, it is about four days earlier in maturity, has better crown rust resistance, has a higher protein level in the groats, and has out yielded Nora by 14 bu/A based on a four year average at the Rice Branch Experiment Station. Since we anticipate this new variety will replace Nora, the Experiment Station will no longer produce Foundation Seed of Nora.

Three graduate students are in the final stages of their research on oat problems. W. T. McGraw is studying dwarfism using Palistine, NC2469-3, and a dwarf Arkansas selection. Nur M. Miah is evaluating Powers' partitioning method for its value for selecting for protein, seed size, and yield. Surapong Sarkarung is studying leaf pubescence derived from Tam O-301, PI 295919, and PI 320793.

# GEORGIA

A. R. Brown (Athens), B. M. Cunfer, J. H. Massey
(Experiment) and D. D. Morey (Tifton)

The oat acreage in Georgia for the 1975-76 growing season totaled 213,000 acres. About 95,000 acres were harvested for grain and the remainder was used for winter grazing. The estimated average yield per acre was 51 bushels making a total production of 4,845,000 bushels.

The winter of 1975-76 was mild and little or no winter killing occurred. The spring was dry from mid-March to early May. There was much rain in May until harvest in early June. The dry spell reduced grain yields but also had a tendency to keep diseases in check. Crown rust was not found in North Georgia and only in trace amounts in the Southern part of the state.

We have been interested in the variation or variability to expect in groat percentages and in grain protein determinations. This past season we sampled and dehulled oats from each of 4 replications of a 12 entry test at Tifton, Georgia. Variation of groat percentage of the 12 varieties is shown in table 1.

Table 1 Groat Percent in Oats
Tifton, Georgia - 1976

| | Replication | | | | | |
|---|---|---|---|---|---|---|
| Variety | 1 | 2 | 3 | 4 | Avg. | Duncan's |
| TAM 0-301 | 71.6 | 65.2 | 70.1 | 72.1 | 71.4 | a |
| Coker 74-22 | 71.8 | 70.3 | 69.6 | 70.2 | 70.9 | ab |
| Coker 234 | 72.5 | 72.2 | 74.1 | 62.5 | 70.4 | ab |
| TAM 0-312 | 72.9 | 69.3 | 61.6 | 68.5 | 69.0 | abc |
| Coker 75-11 | 69.2 | 64.6 | 65.2 | 70.3 | 68.5 | abc |
| Fla. 501 | 70.5 | 66.8 | 64.2 | 65.6 | 67.7 | bc |
| Elan | 69.0 | 67.1 | 68.3 | 64.4 | 67.7 | bc |
| Coker 227 | 68.0 | 67.9 | 65.1 | 68.8 | 67.5 | bc |
| Nora | 68.2 | 65.7 | 64.7 | 65.8 | 66.7 | cd |
| Coker 75-12 | 63.1 | 68.0 | 64.6 | 62.7 | 63.4 | de |
| Ga. 7199 | 63.3 | 65.6 | 58.5 | 59.8 | 61.2 | ef |
| Appler | 60.6 | 55.4 | 55.6 | 59.9 | 59.2 | f |
| | | | | Mean | 67.0 | |
| | | | | LSD (.05) | 3.5 | |
| | | | | CV | 3.6 | |

Dr. Vernon Youngs, Chemist in Charge, Oat Quality Laboratory, Madison, Wisconsin, ran the protein on all 48 samples and returned the data for analysis. Table 2 shows a good test with a rather small amount of variation. These tests show relatively minor variation and give us confidence in groat and protein determinations. It also shows that we need to pay more attention to quality in oats in our breeding and testing programs.

Table 2 Protein Percent in Oat Groats
Tifton, Georgia - 1976

| Variety | Replication 1 | 2 | 3 | 4 | Avg. | Duncan's |
|---|---|---|---|---|---|---|
| Coker 227 | 22.1 | 23.2 | 23.3 | 20.6 | 22.3 | a |
| Coker 234 | 22.2 | 22.1 | 20.3 | 24.1 | 22.2 | ab |
| Coker 74-22 | 21.1 | 23.5 | 21.6 | 22.1 | 22.1 | ab |
| Coker 75-11 | 20.5 | 23.5 | 21.9 | 22.4 | 22.1 | ab |
| Ga. 7199 | 21.2 | 22.5 | 20.8 | 21.7 | 21.6 | abc |
| Fla. 501 | 20.8 | 20.7 | 22.3 | 22.2 | 21.5 | abc |
| Nora | 20.8 | 21.4 | 19.8 | 22.0 | 21.0 | abc |
| Coker 75-12 | 20.0 | 20.1 | 19.8 | 23.0 | 20.7 | bcd |
| Appler | 20.0 | 20.3 | 21.0 | 20.0 | 20.3 | cde |
| Elan | 18.8 | 19.9 | 19.0 | 22.4 | 20.0 | cde |
| TAM 0-312 | 18.7 | 18.8 | 21.1 | 18.6 | 19.3 | de |
| TAM 0-301 | 18.5 | 19.8 | 18.8 | 18.8 | 19.0 | e |
| | | | | Mean | 21.0 | |
| | | | | LSD (.05) | 1.3 | |
| | | | | CV | 5.1 | |

# Indiana

H. W. Ohm, F. L. Patterson, G. E. Shaner, J. J. Roberts (Breeding, Genetics and Pathology), Kelly Day, O. W. Luetkemeier (Variety Testing), and K. L. Polizotto (Extension).

Approximately 220,000 acres of oats were harvested in 1976, 12 percent down from 1975. Average yield was 48 bushels per acre according to the Indiana Crop and Livestock Reporting Service. Most of the acreage was seeded by 1 April and weather conditions were quite favorable early in the season. However, weather became warm and dry by the last week in May and continued as such for the remainder of the oat-growing season. Oats headed beginning the last few days in May. Generally, late-maturing cultivars did not yield well.

Incidence of crown rust was light and spotty throughout the state and did not appear until late in the season.

Barley yellow dwarf virus (BYDV) infection was moderate to serious throughout the state and contributed substantially to the low average yield. BYDV symptoms, including reddish-yellow leaves and reduced height, were more severe in the outer 10 to 30 feet than in the interior areas of oat fields. These symptoms were more severe in oats adjacent to areas seeded to perennial grasses such as fescue.

Several breeding lines in which crown rust resistance from CI 8454 or the Wahl #8 gene has been combined with good tolerance to BYDV look promising and seed is being increased for further testing. Additive genetic variance predominated for percent protein, yield and heading date when measured in advanced-generation progeny from an oat cross. BYDV infection decreased oil by 0.2 percentage units and increased protein by 0.5 percentage units in paired (BYDV and control) plots.

Mark Iwig will complete his Ph.D. graduate work soon and has accepted a position as wheat breeder with Pioneer International, Inc.

# IOWA

K. J. Frey, J. A. Browning, M. D. Simons,
Ron Skrdla, L. Michel

The area of oats harvested for grain in Iowa in 1976 was 1.5 million acres. According to the U.S. Crop Reporting Service, the mean Iowa yield was 59 bu. per acre and total production was 87 million bushels. Two things were unique in Iowa production in 1976: (a) the oat crop was better than any year since this research team began working at Iowa State University (1953), and (b) a sizable proportion of the oat acreage planted was harvested for silage, especially in Northwestern Iowa. We recorded the first 200 bushel yield for oats in Iowa. At Kanawha, Lang variety yielded 201 bu. per acre in the Iowa Oat Variety Test. The mean yield for all entries in that test was over 150 bushels per acre.

Most of the oat acreage was sown in March, and the season was cool with adequate moisture in most parts of the state. Drought began to occur in June in Northwestern Iowa, and this was the reason for so many oats being cut for silage in that part of the state.

The early multiline varieties continue to be planted on a large acreage in Iowa.

A number of changes have occurred in our graduate student group in 1976. Ray Shorter and Ventura Gonzalez received Ph.D. degrees and returned to their respective home countries of Australia and Venezuela. Susan Behizadeh, Diana Bloethe, Majid Rezai, and Luis Barrales received M.S. degrees. Behizadeh, Bloethe, and Rezai are continuing graduate study at Iowa State, and Barrales has returned to his home country of Chile. Additions to the graduate student group were Teddy Lund, Stan Cox, Ann Marie Thro, and Jane Scott, all from the U.S., and Paul Murphy, Jimi Adegoke, and Urbano Vega from Ireland, Nigeria, and Venezuela, respectively.

## KANSAS

E. G. Heyne

There was a slight increase in the oat acreage in Kansas in 1976. Oats were seeded on 300,000 acres and the total production was 10,080,000 bushels for an average of 42 bushels per acre from 240,000 harvested acres. Seeding conditions were favorable but a dry April slowed growth. May and June rains and cooler temperatures resulted in above average yields. There were only local disease problems. Barley yellow dwarf was widespread but only severe in several areas, two of which included our performance trials at Parsons and Manhattan. Under these conditions Lang did very well and Bates was also much better than other cultivars. Certified seed of Andrew, Lodi, Pettis, Spear, Stout, and Trio were produced in Kansas in 1976. We plan to grow seed fields of both Lang and Bates in 1977. Leaf (crown) rust was fairly common but too late to cause much damage. Only traces of stem rust occurred in 1976.

We have curtailed our oat research and at present have no breeding program and rely on other states for new germplasm.

Very little winter oats are grown and considerable winter killing occurred for the first time in several years. As there are no wheat acreage allotments, the farmers prefer to grow winter wheat instead of winter oats or barley.

## MICHIGAN

J. E. Grafius, David H. Smith, Robert P. Steidl

Menominee oats (C.I. 9236) tested as Mich 64-151-123 will be released to growers of certified seed in the spring of 1977. The release is intended to satisfy a need in northern Michigan and only about 200 bushels are available. It is not anticipated that there will be a demand for Menominee from other states but in compliance with North Central policy, seed will be shared if a demand develops.

A grant from the Quaker Oats Company supporting a post doctroal position on cereal leaf beetle resistance with Robert Steidl as the incumbent has been operating since last summer. A seven parent diallele has been made using C.I. 521, C.I. 1625, C.I. 4867, C.I. 4893, P.I. 311577, Froker and Korwood. Differences in larval weight gain have been observed on the parents using an extended period of infestation. The $F_3$ lines of the diallele will be tested this spring in the field under a large cage for larval feeding damage and ovipositional preference.

# MINNESOTA

D.D. Stuthman, H.W. Rines, R.L. Thompson and R.D. Wilcoxson

Production and Cultivars. Approximately 92 million bushels of oats were harvested from slightly more than 2 million acres in 1976. Most of the state had considerably less than normal rainfall resulting in an average yield of only 45 bushels per acre. The total production was the lowest since 1934. There was a large increase in smut infection, particularly with the variety Froker. Reports of up to 35% infection based on actual head counts were received. Of the currently recommended varieties, Noble, Stout, Chief, Lodi, Froker and Dal, only Noble and Dal give resistant reactions. Therefore, we are again urging chemical treatment of susceptible varieties. Fortunately, we are increasing several lines all of which are resistant to smut in our tests. Selection 71101 has been named Lyon and released to seed growers for 1977 planting. (A description appears in another section.) A second selection, 73231, is being increased, and may be released as early as 1978. Release of a third selection, 71211, is anticipated for the 1979 planting season.

Research. Recurrent selection for yield, and protein improvement utilizing A. sterilis are continuing. Two areas receiving increasing attention in our breeding and research programs are smut resistance and semi-dwarfness. We have made a number of crosses with OT 184 dwarf and are now making three way crosses. Initially, late maturity and retention of the panicle in the boot are traits which will require modification. Several other sources of "dwarfness" are also being utilized to a lesser extent.

Avena fatua. We are continuing to evaluate the A. fatua collections which Dr. L. W. Briggle acquired while he was at Minnesota. Collection differences exist for most characters studied thus far; however, the total range for some quantitative characters, particularly protein content, appears less than that for A. sterilis. Results from preliminary screenings with Barley Yellow Dwarf Virus and Cereal Leaf Beetle at Illinois and Michigan State, respectively, are encouraging. Collections selected for resistance or tolerance will be re-evaluated at these locations in 1977.

Personnel. Howard Rines joined our group as USDA, ARS research geneticist in September 1976 as a replacement for L. W. Briggle. Dr. Rines received his B.S. and M.S. from Purdue (the latter under the direction of O. E. Nelson) and his Ph.D. from Yale, and was most recently on the faculty of the Botany Department at the University of Georgia in Athens.

Paul Langseth completed his M.S.; his thesis research dealt with variability in A. fatua.

# MISSOURI

Dale Sechler, J. M. Poehlman, and Paul Rowoth (Columbia),
Boyd Strong (Mt. Vernon) and Lewis Meinke (Spickard)

Oat acreage increased to 260,000 acres in 1976 since weather and soil conditions were ideal for early seeding. Of this, 170,000 acres were harvested with an average yield of 40 bu/acre. Many oats were seeded in February and early March and temperatures remained relatively cool until late June, contributing to good growth and development. There were reports of 100 bu/acre and over grain yields, which is unusual for Missouri.

The BYDV disease was very damaging on oats throughout the State in 1976. Susceptible varieties yielded very little and were often abandoned or cut for hay. Since seed was in short supply, many acres were seeded to 'feed oats' or susceptible varieties. Otee, the most widely grown BYDV resistant variety, showed good tolerance and produced excellent yields.

Powdery mildew was prevalent in the nursery at Mt. Vernon. Mildew is occasionally seen on winter oats in Missouri but very rarely on spring seeded oats. Pettis and Nodaway 70 were among the most mildew tolerant spring varieties.

Smut appears to be a continuing and increasing problem in commercial fields. Many growers will not use a seed treatment. Genetic resistance in a variety is highly desired.

The Mo 06072 (Pettis X Fla 500) selection will be released in February, 1977, under the name of Bates. Grain yield and quality has been good along with resistance to BYDV, smut and common races of crown rust.

Applications of the gametocide DPX-3778 at 1,000, 2,000 and 4,000 ppm at the early, mid and late boot stages of growth on Otee oats did not adequately control seed set when heads were bagged. 4000 ppm applied at early boot was most effective but seed set was also reduced on panicles that weren't bagged.

Winter oat acreage remains extremely low although some effort continues to breed a more winter hardy oat with good agronomic type.

## NEBRASKA

John W. Schmidt

Oat acreage was up in 1976 with 640,000 acres harvested but the average yield of 42 bushels per acre was below the previous 5-year average of 49 bu/a. Nevertheless, this was a good crop in view of the moisture deficit and hot winds before crop maturity. Heat lodging was common in commercial fields and very evident in our nurseries. Because of the dry conditions there were no diseases. Thus the yield produced was governed largely by the varietal response to the hot windy conditions resulting in a yield spread of 11 to 108 bu/a in the Early Oat Performance Nursery and 42 to 105 bu/a in the Midseason Oat Performance Nursery.

The Nebraska Agricultural Experiment Station joined the Missouri Agricultural Experiment Station in the release of 'Bates' spring oats (Missouri Sel. 06072, C.I. 9211). Bates and 'Lang' have performed well in Nebraska the past two years and should contribute toward improved oat production. Foundation seed of Lang will be distributed in 1977 and of Bates in 1978.

## NEW YORK

Neal F. Jensen

The Astro variety is being accepted more rapidly by growers than any variety since the import of Garry more than 20 years ago. The growers cite its good yield on a short, lodging-resistant straw.

Breeders who have received seeds of N.Y. Oat Composite I Germplasm should be aware that, in addition to the liklihood of crown rust resistance and heavy test weight of grain, unusually high groat protein levels in some lines has been found at Ithaca. Also, Dr. Andre Comeau and Dr. J.P. Dubuc of the Research Station at Ste-Foy, Quebec, inform me that they have isolated and increased a sub-population which is predominantly resistant to BYDV.

An unknown factor (air pollution suspected) has made it impossible to grow and hybridize oats in the greenhouses or growth chambers used by the cereal project at Ithaca---this has been the case for at least a decade. The plants lack vigor, leaves are discolored and show early die-back, heading either does not take place or if it does the panicle is blasted and sterile. Occasional plants or heads produce a few seeds. We have varied most parts of the environment with no success. We would like to hear from breeders who may have had similar experiences.

Of course, oats is known to be relatively sensitive (e.g., light, blast, pollen production, day length and response to latitude, etc.). In breeding oats it is common knowledge that some varieties make better male parents than others, for example, in our program Rodney is one of the best pollen producers (copious amounts) while Tioga is one of the poorest (few). These differences are especially noticeable when the plants are stressed. To test the effect of stress (the unknown factor or factors mentioned earlier) a small experiment was run in 1972 in an environmental growth chamber. I selected 10 oat genotypes on the basis of their history of seed set under stress conditions and their record as pollen parents in crosses. To illustrate, good pollen producers have a good record as male parents in crosses and have not shown noticeable field stress problems; poor pollen producers seldom get used as male parents in crosses and some have shown stress reactions in field production, e.g., Tioga and Garry 5 in Arizona winter increases. Five genotypes judged good pollen types (+) and 5 judged poor or questionable (-) were chosen; no rankings within either group of five was attempted. The experiment consisted of 6 replicates of single plant pots and the measurement unit was the number of kernels produced per plant. The only treatment was the anticipated stress environment although I should stress that we did the best job we could of raising these plants. Pot positions were rotated once a week. The results were as follows:

| | Mean seeds per plant | |
|---|---|---|
| Five good pollen types (+): | No. | Rank |
| Harmon | 520 | 1 |
| Rodney | 504 | 2 |
| Niagara | 327 | 4 |
| CA 123-33 | 232 | 5 |
| NY 5279 | 219 | 6 |
| Five poor pollen types (-): | | |
| Dal | 356 | 3 |
| Orbit | 161 | 7 |
| Garry 5 | 144 | 8 |
| Stormont | 102 | 9 |
| Tioga | 60 | 10 |

Thus, it may be seen that the agreement between fitness (ability to leavy progeny) under stress agreed very closely with our pre-estimate of pollen type. There is one exception, Dal, which clearly should be in the + pollen type category.

## NORTH CAROLINA

C. F. Murphy and T. T. Hebert

Cultivars. Firecracker was released in 1976 and is described elsewhere in this newsletter. Salem continues to perform extremely well, especially in the piedmont area, where it has exceeded the yield of the popular cultivar Carolee by nearly 20 percent.

Oat Breeding. Efforts to combine high protein and agronomic acceptability in A. sativa x A. sterilis derivatives are continuing. We have gone through three generations of "backcrossing" high protein lines to several of our most promising experimentals and the results are encouraging. We have reached the stage of crossing A. sterilis derivatives with fairly good yield and high protein (27%) with conventional A. sativa lines with excellent yield and good protein (20%). One of our conventional experimental lines, N.C. 73-15, has exceeded currently grown cultivars in pounds of protein produced per acre by more than 20 percent, in two years of testing.

## NORTH DAKOTA

M. S. McMullen & G. S. Smith

Oat production in North Dakota totaled 44.8 million bushels in 1976, down 20 percent from 1975. Acreage harvested was down 14 percent to 1,180,000 acres and yield decreased 3.0 bushels per acre to 38.0 bushels/A. Reports indicate a 17 percent increase in oat acreage "planting intentions" for 1977.

Due to the dry growing season, very little crown rust or stem rust was observed in 1976. The loose smut infections observed in other states have not been noticed in North Dakota.

Mr. James Oard from Oregon State University joined the oat improvement project as a M.S. student.

# OHIO

Dale A. Ray

Production. The oat acreage harvested in Ohio for grain in 1976 was estimated at 500,000 acres, the same figure as for the previous crop year. The average yield of 55.0 bushels per acre represented a decline of 6.0 bushels from the 1975 yield. Weather conditions and soil moisture were favorable for early seeding and good vegetative growth, however a pre-harvest drought reduced yields and bushel weights on an early harvest schedule. Oat diseases generally were light, but severe infection with the barley yellow dwarf virus in the nurseries and breeding materials grown at Columbus was a major factor in determining yield comparisons.

Oat Varieties. Noble and Otee have become the most popular oat varieties in 1976. In addition to these varieties, Clintford, Clintland 60, Dal and Stout are recommended for production in Ohio. Noble ranked first, closely followed by Otee, in average yield from a six-location field-performance test.

Oat Breeding. Progress was made in a selection and line multiplication program with two groups of material, advanced-generation selections from 13 bulk crosses of an *Avena sterilis* line with several adapted spring oat varieties and from 10 selections obtained from Clintland 60-Rodney x Putnam 61. The high incidence of infection with barley yellow dwarf virus in the nurseries provided an excellent opportunity to screen the breeding materials for BYDV tolerance. From an extensive planting of panicle-rows, harvest was made only of the rows exhibiting BYDV tolerance, adapted maturity and plant-type uniformity. As seed quantity permitted, uniform panicle-rows were bulked for entry in rod-row tests or for further observation and multiplication.

# OKLAHOMA

H. Pass, L. H. Edwards, E. L. Smith, and E. A. Wood

Production. The Oklahoma state average oat yield and acreage fluctuate from year to year. The 1976 oats yield was good at 45.0 bushels per acre, an increase of 37 percent over the 33.0 bushels average in 1975. Harvested acreage of 132,000 was a 10 percent increase over the previous year. These increases in total acreage and bushels per acre resulted in a total production of 5,940,000 bushels approximately 30 percent above 1975. Good moisture and cool nights in the spring were major factors contributing to this increased yield.

Oat Varieties. Most of the oat acreage is seeded to Cimarron, Chilocco and Nora varieties. Nora acreage has been increasing each year by the grain farmers, but is susceptible to winterkilling in some years and to Barley Yellow-Dwarf Virus that has been present in many fields in both 1975 and 1976.

We are increasing a selection from the cross between Chilocco and Ora, OK7222336, for possible release in 1977. It has outyielded Chilocco by 17 bu./A and Nora by 20 bu./A for 3-year average in state yield tests.

Personnel. Mr. E. A. Wood Jr., ARS Entomologist, retired January 1, 1977. Woody's (Mr. Greenbug) major responsibility was in greenbug control and resistance work in wheat and grain sorghums; also, he contributed his effort in our attempt to transfer greenbug resistance into our adapted oat varieties.

South Dakota

D. L. Reeves

Production: The seeded oat acreage increased 30,000 acres in 1976 to 2,560,000 acres. However, only 1,420,000 acres were cut for grain which was 800,000 acres less than the previous year. This was caused by low spring soil moisture, high temperatures and very limited rainfall. Many areas received four inches or less of rain from March thru June. Therefore, some fields were abandoned while many others were cut for hay. Grain production dropped to 42,600,000 bushels which was 43% of the previous years production and well below the 1971-75 average of 100,249,000 bushels. The average yield was 30 bu/acre.

Varieties: The leading varieties were Burnett, Chief, Spear, Nodaway 70, Froker, Noble, Garland and Holden. Because of three years of dry weather the acreage of early and midseason varieties has increased while later varieties have produced poorly and therefore are being planted less. Hog producers are increasing their use of high protein oats in their rations and seem well satisfied with the results.

Diseases: Leaf and stem rust were present in only small amounts. These diseases have been so scarce that the oat nursery has not been rated for three years. Spreader rows were inoculated with leaf rust, however, rust developed only where inoculated. Froker continued to show increasing amounts of smut in commercial fields. More natural smut was present in the nursery than for the previous five years combined.

Equipment: Our head rows were planted using plastic trays for the first time this year. Two people working alone planted about 10,000 rows in about four days including several stops for adjustments and other problems. Harvesting of the head rows as well as short yield rows was speeded up considerably by threshing plots with an intermediate size Vogel as they were cut.

# TEXAS

M.E. McDaniel, J.H. Gardenhire, K.B. Porter, Norris Daniels, M.J. Norris, Earl Burnett, Lucas Reyes, and L.R. Nelson

Production: The seeded acreage of oats in Texas in 1976 was 1,330,000 acres. The oat acreage appears to be stabilizing at about this level. However, if wheat prices remain at the current low levels, the oat acreage probably will increase significantly. Protracted drought conditions through the winter and spring months caused widespread crop abandonment or graze-out. Only 390,000 acres of oats were harvested for grain. The good spring rainfall enabled much of the Texas small grain acreage to recover remarkably well. The average yield of the harvested oat crop was relatively good (37 bushels per acre).

Research: Breeding for resistance to crown and stem rust is being emphasized at College Station. Approximately 20 Avena sterilis lines have been used as crown rust resistant parents in the Texas breeding program. The resistance genes from several of the A. sterilis parents are being backcrossed into several popular commercial varieties for possible release in pureline and/or multiline form(s). The currently-resistant commercial varieties TAM O-301, TAM O-312, Coker 227, and Coker 234 have been intercrossed to attempt to "stack" the different resistance genes of these varieties in desirable breeding lines. Crosses were made with the Minnesota breeding lines CI 9221 and 9222 in 1976. $F_2$ populations from these crosses have been tested for seedling reaction to race 31 of stem rust, and it appears that the high-level seedling resistance of these parents is relatively easy to recover. Although the germplasm release for these lines indicates that the seedling resistance of each is conditioned by pg 12 (P.G. Rothman, 1975 Oat Newsletter, page 62) we have found a distinct difference in the seedling reactions of CI 9221 and CI 9222 and of their respective cross progenies. CI 9221 and its resistant derivatives had no obvious sporulation, while small pustules (type 1) were formed on the second leaves of CI 9222 and its derivatives. The excellent seedling resistance of CI 9221 to crown rust races 325 and 264 B is a welcome "bonus". CI 9222 is susceptible to these races.

Striking differential iron chlorosis of oat cultivars was noted in both field and greenhouse tests in 1976. Treatment of the soil with iron compounds caused more than a three-fold increase in dry matter production of the iron-sensitive variety TAM O-312, while the yield of the chlorosis-resistant variety Coker 227 was not improved significantly by the treatment.

J.H. Gardenhire is continuing oat greenbug resistance breeding work at Renner (Dallas). The recent shift in greenbug biotypes has overcome the resistance of some previously-resistant material.

Rusts: No major shifts in races were observed. Crown rust races 264 B and 325 continued to predominate. Stem rust races 31 and 61 remained the most prominent.

Personnel: Dr. L.R. Nelson accepted a small grain and forage research position at the Texas A&M Research and Extension Center at Overton. Dr. A. Robert Shank previously held this position. He resigned to accept employment with a private plant breeding firm.

## UTAH

R. S. Albrechtsen

Much of Utah's 1976 oat crop was seeded later than normal due to a somewhat cold, wet spring. This was followed by warm, dry conditions in May and June, resulting in rather poor tillering and abnormally early heading. Hard June frosts in some parts of the state caused varying degrees of floret sterility and necessitated cutting part of the crop for hay. The combination of adverse conditions resulted in a mediocre grain crop of below-normal quality. Losses from diseases were minimal. The oat acreage has remained small but constant over the last several years.

We are not carrying on an active oat breeding program. Promising new material from other programs is identified by growing the Northwestern States Oat Nursery and other materials from individual breeders. Some promising hulless lines have been identified in tests over the past several years. Cayuse is the top-yielding named variety on a long-term average, and is presently the most widely grown variety in our state.

## Oats in Washington

C. F. Konzak, M. A. Davis, K. J. Morrison, P. Reisenauer

The cool wet 1976 summer in Pullman was conducive to high oat yield performance. Cayuse and derivatives performed exceptionally well, with yields in the range 150 bu/ac. Lines WA6013, WA6014, WA6159 and WA6161 derived from the cross Cayuse/CI2874 or reciprocal showed greater BYDV tolerance than Cayuse in tests conducted cooperatively by Dr. C. O. Qualset in Davis, California. New sublines from a line of Cayuse/CI2874 which was segregating for BYDV tolerance proved to have higher BYDV tolerance than Cayuse in the Davis tests, and most lines showed good yield performance at Pullman in 1976. One of the lines scored 3 on a scale of 9 with Cayuse at 7 in the Davis trials, while others were scored 4 to 6. A hulless oat, OT195 showed surprisingly good yield performance in Pullman, approaching the level of Cayuse if the adjustment was made for hulls. Because of greater value of hulless types, especially for swine feeding, increased testing, and possibly local breeding work for BYDV tolerance appears desirable.

Breeder's seed increases of WA6013 and WA6014 were made in 1976. One or both may be considered for possible release.

# WISCONSIN

R. A. Forsberg, M. A. Brinkman, Z. M. Arawinko, R. D. Duerst, E. S. Oplinger, H. L. Shands, V. L. Youngs, and D. M. Peterson (Agronomy), and D. C. Arny and C. R. Grau (Plant Pathology)

The 1976 Wisconsin oat crop was severely damaged by a prolonged drought which resulted in the fewest harvested acres since 1882 and the lowest total production since 1907. Production of 55,040,000 bushels was 19.2 million bushels less than was produced in 1975 on nearly the same number of planted acres (1,500,000 acres). The statewide average grain yield was 43 bushels per acre, a reduction of 12 bushels from the previous year.

Planting dates near April 10 in many areas of the state were the earliest since 1946, and soil moisture was excellent the first 4-6 weeks of the crop season. Unfortunately, many oat fields did not receive meaningful rainfall the last 6-8 weeks of the growing season. Some varieties and selections responded better to the drought than others, but maturity was not a key factor. At Madison, the correlation between grain yield and date of heading among 100 entries in a four-replicate test was +.06 which indicates essentially no relationship between yield and maturity in that test.

The ample early season moisture and vigorous seedling growth resulted in many reports of halo blight. Leaf and stem rust were virtually absent, but an increase in the incidence of oat smut has resulted in increased surveillance and control measures including seed treatment of Breeders Seed and Foundation Seed with a Vitavax-Thiram combination. (A separate report on oat smut appears elsewhere in this newsletter.) Army worm and cereal leaf beetle activity was rare or absent in 1976.

Equipment. We are now planting our four-row oat, barley, and wheat yield trial plots with a spinner planter unit which uses an 8-inch cone to feed a spinner-divider. Seed distribution within rows and among the four rows has been good. Time is saved by preparing only one seed packet per plot (vs four), and rate of planting is increased since the tractor does not stop as it moves from range to range across the field. Seed mixtures have been surprisingly infrequent. (The unit is manufactured by Kincaid Equipment Manuf. Corp., Haven, KS.)

Varieties. Wright was produced on Wisconsin farms for the first time in 1976. It continues to be one of the leading varieties in Wisconsin tests for high grain yield and test weight. USDA Variety Plant Protection Certificates were granted for Dal, Goodland, and Wright oats in 1976.

Dr. H. L. Shands has continued his U.S.A.I.D. project concerned with the development and utilization of oat germ plasm in developing countries. Seed aliquots of bulk populations of many individual, diverse oat crosses were made available to oat workers in several countries, e.g., North and South America, the Middle East, Turkey, and elsewhere, and many of the resulting nurseries were inspected by Dr. Shands.

The thesis research of Wesley R. Root is concerned with the inheritance of groat conformation including groat length, width, volume, and density. He is completing his Masters program and will continue on for the Ph.D. P. Doug Brown, on leave from the Canada Department of Agriculture, Winnipeg, Manitoba, has initiated a Ph.D. research program concerned with the transfer of stem rust resistance from Avena barbata to A. sativa. James A. Radtke's M.S. thesis research involves the cytogenetic evaluation of three oat translocation lines. Arlei S. Terres (Brazil) is studying the influence of different kinds and dates of application of nitrogen fertilizer on oat grain and straw yields, their ratio, and on groat protein (M.S.). David Langer is working on atrazine tolerance in oats (M.S.), and Michael Vande Logt (M.S.) is studying stomate concentration in oats and is also working with a small set of A. fatua x A. sativa crosses. Madeline F. Chinnici is studying "blasting" in oats under controlled environmental conditions in the Biotron (M.S.).

Dr. Craig R. Grau is our new Extension Plant Pathologist for small grains. Dr. Grau completed his graduate work at Minnesota in 1975, followed by Postdoctoral study at North Carolina State University, Raleigh, N.C.

## Oats in Poland

Maria Mazaraki
Plant Breeding and Acclimatization Institute
Cracow, Poland

Oats make up about 1.2 million ha of the 7.5 million ha of small grains in Poland. Average yields for the past few years are as follows:

1973 - 25 q/ha
1974 - 27.5 q/ha
1975 - 22 q/ha
1976 - 29.9 q/ha

The principal varieties grown are Leanda (Netherlands), Diadem (Czechoslovakia), and Romulus (East Germany).

Diseases that occur include *Puccinia coronata*, barley yellow dwarf virus, *Erysiphe graminis*, and *Septoria avenae*. Studies of the pathogenic specialization of the crown rust fungus over the past several years have revealed a total of 31 different races. These races differ greatly in pathogenicity, and can be roughly divided into two groups. One group, regarded as weakly aggressive, consists of 23 races characterized by their ability to attack from 0 to 5 differential varieties. The second group, made up of 8 races, attacks from 6 to 9 varieties. These and other observations suggest that there is a negative correlation between the prevalence of a race or group of races and the number of differential varieties that are parasitized.

# Oat Breeding in Western Australia

P. A. Portmann
Department of Agriculture
Western Australia

The new cultivar West has now been released for two seasons. It is starting to make inroads on the area sown to oats in Western Australia, which is currently about 260,000 hectares. Stem rust was severe during 1976, but West's resistance remained effective. A major problem in my oat breeding programme has been the inability to develop material which does not lodge in the high rainfall areas (> 500 mm). Material which is suited to the bulk of the state's cereal areas, often grows to a height in excess of 2 metres under high rainfall conditions. This causes severe lodging. Most sources of dwarfness have been unsatisfactory due to the "club-head" effect, and the resultant brittle nature of the panicle.

The mutant dwarf from Canada, Dwarf OT 184, appears to be an answer. Despite the very poor adaptation of OT 184, crosses between it and the two local cultivars Swan and West, have produced $F_2$ plants that agronomically are very satisfactory. Segregation ratios in $F_2$ support the Canadian evidence that dwarfness is controlled by a single dominant gene. It would appear that the gene can be inactivated by the environment. Both the parent dwarf and the $F_1$ progeny when autumn sown in the glasshouse showed no dwarfness. However the $F_1$, when summer sown in the glasshouse or when autumn or winter sown in the field showed complete dwarfness. Perhaps an interaction between daylength and temperature inhibits dwarfness. Fortunately this should not present a problem as most oats are not grown in the glasshouse!

$F_2$-derived lines of naked oats from crosses between local material and naked lines from Cambridge P.B.I. were yield tested at one site in 1976. The results show that the material is still very poorly adapted to our environment.

# Spring Oat Breeding at Rothwell

D. J. Thompson
Rothwell Plant Breeders
Lincoln, England

Oat Breeding has been undertaken at Rothwell Plant Breeders for a number of years and the two most advanced Rothwell varieties are undergoing Official Trials in the U.K. and several more are in advanced stages of yield testing. The breeding programme is concerned solely with producing spring oats and is based on the pedigree system. Particular emphasis is placed on breeding for mildew resistance and high yield. Mildew is a major cause of yield loss in the U.K. and our breeding programme is designed to incorporate resistance to the four known races of mildew prevalent in this country. Other disease resistances incorporated into our breeding programme but which assume a lesser importance in the U.K. are to Crown Rust, Cereal Cyst Nematode and Barley Yellow Dwarf Virus. Varieties from various collections are screened by our pathology department for possible inclusion into our crossing programme.

Yield testing begins on F4 material and is continued in subsequent generations at an increasing number of sites, entry of the best varieties to Official Trials being made at the F7 stage. Breeding and trial work is based at Rothwell, Lincolnshire with several trial outstations.

Oat crossing is usually performed at Rothwell in May, in the glasshouse, using the approach method of introducing whole ripe anthers to emasculated florets. About 50% of crosses are successful with an average of 4 seeds set per cross. Parental material for the programme is mainly high yielding and disease resistant European lines and we would be pleased to exchange material particularly for daylength insensitivity, mildew resistant and barley yellow dwarf virus resistant lines. Early generations are continued by single plant selection.

The oat market in the U.K. is declining gradually and presently approximately 233,000 ha is sown to winter and spring oats. For Europe the area sown was approximately 2,190,000 ha in 1976 with an average yield of 33 q/ha.

# Oat Production in Turkey

M. Nuri Taysi
Agricultural Research Institute, Eskisehir, Turkey

Oat Production in Turkey, summarized for the year 1969-74, is shown below:

| Years | Sown area hectares | Production Tons | Yield Kg/Hectare |
|---|---|---|---|
| 1969 | 350200 | 468000 | 1336 |
| 1972 | 295000 | 396000 | 1352 |
| 1973 | 280000 | 380000 | 1362 |
| 1974 | 275000 | 380000 | 1382 |

As seen in the table, the acreage of oats has been decreasing in the recent years. The main reason for this is the advantage of wheat and barley over oats in yield and price.

Breeding of spring and winter-oat varieties was started at our institute in 1930-1931. Two varieties called "2-3 Apak" and "1-5 Bozkir" were found by selection. The former is being produced by State Farms and sown by farmers. 2-3 Apak (*Avena sativa* type) has large, white and plump seeds and is short. It has a high commercial value. It is susceptible to lodging and resistant to rust. It has a good winter hardiness and high yielding capacity.

The other variety, 1-5 Bozkir (*Avena byzantina* type) is larger seeded than other varieties and red in color. Although it is a rust resistant and high yielding variety, its commercial value is low because of its red seed.

The other promising varieties that are well adapted to our ecology are as follows:

443 - Ful brence: it is a variety that came in 1959 from University of Ankara and that was originated in America. It is large and long seeded, winter hardy, high yielding, rust, susceptible, and resistant to lodging.

421 - Grey Winter Letaria: American origin, good winter-hardiness, resistant to lodging, short stemmed, high yielding, early variety.

504 - Mustang CI 4660: American origin, low winter-hardiness. Moderately resistant to lodging, resistant to diseases. Medium height and yield. Moderately early.

505 - Cimarron CI 5106: American origin, good winter-hardiness, resistant to lodging, long-stemmed, high yielding, early variety.

531 - Sporen Av-5: Good winter-hardiness, resistant to lodging, medium height, moderately early, moderately resistant to diseases, medium yielding variety.

537 - Wintok Av-77: Moderate winter-hardiness, susceptible to lodging, medium height, resistant to diseases, medium yielding, early variety.

545 - 66 A/76: It has come from University of Ankara. Good winter-hardiness, moderately resistant to lodging, medium height, resistant to rust, medium yielding, very early variety.

546 - 66 A/84: Also brought from University of Ankara. Yellow, plump seeded, better winter-hardiness than the other varieties, high yielding variety.

547 - 66 A/85: From University of Ankara. Good winter-hardiness. Resistant to lodging and rust, long stemmed, medium yielding, very early variety.

More oats are produced in our region than the other regions in Turkey. The average oat yield per decare is 200-250 kg. Seeding is generally established in the beginning of April, and it is harvested in August. The predominant diseases of our region are rust and smut.

Breeding of winter and spring oat varieties for the characteristics most important in our region is being done using material brought from out of the country and the other regions in our country.

Our greatest problem with oat production in this region is long and hard winters. We need to improve varieties with better winter-hardiness than present. We would appreciate receiving material, especially segregating populations from promising crosses, and general information on winter-hardiness.

# IV. EQUIPMENT AND TECHNIQUES

## New Plot Binder

F. H. McNeal

Small grain workers at the Montana Agricultural Experiment Station have purchased a 2-row Suzue Binder, the first of its kind to be sold in the U.S. The machine is self-propelled, patterned after the modern corn binder, cuts either one of two rows, ties the cut grain into a bundle, and ejects the bundle to one side, allowing the one man operator to cut continuously. It was operated during the entire 1976 harvest season without mechanical trouble. It costs about $2000; further details can be obtained from F. H. McNeal, Department of Plant and Soil Science, Montana State University, Bozeman, MT 59715.

## Controlled Release Fertilizer for the Greenhouse

L. J. Michel

Osmocote is a controlled release fertilizer composed of small granules of a water-soluble nutrient which has been coated with multiple layers of polymeric plastic. Several formulations have been used successfully on oats, 14-14-14 releases its nutrients at a constant rate for about 90 days and continues to feed at a reduced rate for an additional 30 days, 19-6-12 supplies nutrients over a 120 day period. As many as 300 $F_2$ seeds have been obtained from a single $F_1$ seed planted in a 4" pot. To use this fertilizer place about 2" of soil in a pot, use 1 teaspoon Osmocote, add a pinch of your favorite systemic insecticide granules and stir until thoroughly mixed. Fill pot with soil and plant seed. The insecticide will keep oats free of aphids and spider mites until near heading.

Osmocote is made by the Sierra Chemical Co., 1001 Yosemite Drive, Milpitas, CA 95035. It can be obtained in 50 lb. bags from the A. H. Hummert Seed Co., 2746 Chouteau Ave., St. Louis, MO 63103 or in 3 lb. bags from the Geiger Supply Co., Box 285, Harleysville, PA 19438.

# Application of a Microwave Oven to Oat Research (Summary)

Deborah Youngs and V. L. Youngs

In recent years microwave ovens have become popular household items. Their operation depends upon the absorption of microwave energy (2450 MC) by a material to produce increased molecular motion, and as a consequence, heat. In this study we used two household microwave ovens (650 and 675 watts) to determine the effect of microwave energy on oats.

Samples of oat groats and ground oat groats were dried in the microwave ovens. The ovens were not satisfactory for rapid removal of all moisture without charring the sample. However, it was possible to quickly reduce the moisture levels of the samples to less than four percent. This would be useful in preparing samples for lipid analysis by nuclear magnetic resonance.

It was hypothesized that a short exposure of oats to microwaves might completely destroy all germination since it seemed some of the vital enzymes should be easily denatured by this form of energy. Although percent seed germination varied inversely with exposure time, considerable exposure was required to effect a change in germination. This change was probably due to the heat produced.

Denaturation of the enzyme lipase was attempted by exposing oat samples to microwaves. After exposure, samples were ground and allowed to stand three months at room temperature. Then the lipids were extracted with petroleum ether, and the free fatty acids were separated by thin-layer chromatography. Lipase activity was estimated by comparing the size and density of the free fatty acid spots obtained from the exposed samples with a control (no exposure). Lipase was denatured only after considerable exposure to microwaves, which also nearly charred the sample. Again, it is probably the heat produced by microwaves that denatured the lipase.

Microwave ovens should be ideal for quick-thawing frozen samples, or frozen standards. However, since it is difficult to predict how materials will respond to microwave energy, each potential application must be thoroughly checked.

# V. OAT GERMPLASM AND NEW OAT CULTIVARS

## Committee Report - Improved Utilization of Oat Germplasm

Our committee, consisting of J. C. Craddock, chairman, D. J. Schrickel, D. M. Wesenberg and D. D. Stuthman, met prior to, and in conjunction with, the National Wheat Improvement Committee Meeting in October 1976 in Lincoln, NE. Our principle item of business was to consider a proposal developed by a subcommittee of the NWIC to increase the utility of the World Collections of Small Grains. Ultimately the group agreed that the problem should be divided into three parts (1) compilation of existing data into easily retrievable form, (2) evaluation of all existing collections for important traits for which information is not available, and (3) development of a systematic evaluation of all new contributions to the collections. The Germplasm Committee of NWIC is currently trying to enlist someone to develop a proposal to obtain funding for items 1 and 2. It is intended that the funding proposal will describe in some detail the mechanics of evaluating these germplasm resources. Concurrently, efforts will be made to include a request for resources to fund item 3 in the next USDA budget.

# USDA Oat Collection

J. C. Craddock

During 1976 Cereal Investigation (CI) numbers were assigned to 40 oat accessions. I believe too many lines of potentially good germplasm are not being conserved. You may have breeding materials not necessarily outstanding in your current research program, that could be of potential value in the future. Why not contribute these lines to the collection. All that is required is the submission of a seed sample (any amount up to 400 grams) and a statement that the material is open stock. Any pertinent information that your care to offer is always helpful in documenting the accessions.

The Oat Variety Handbook will be available for distribution in 1977. This handbook is in loose leaf form so that the descriptions of new cultivars may be added periodically. A mailing list is being maintained to provide the handbook and supplements. If you would like your name on this mailing list please let me know.

Proposed names for cultivars to be released should be cleared through the Trademark Division for possible name duplication and/or infringement on existing trademarks. I will be glad to make this check for you. Please submit three proposed names in order of preference, along with your station number and/or CI number.

There has been no contributions to the Oat Gene Bank since 1968. If this very worthwhile project is to be maintained, we must depend on you, the Contributors. PLEASE REMEMBER THE GENE BANK before discarding your excess seeds from $F_1$ and $F_2$ plants.

A listing of the new accessions to the USDA Oat Collection follows.

## C. I. NUMBERS ASSIGNED IN 1976

| C. I. Number | Name or Designation | Parentage | Source |
|---|---|---|---|
| 9252 | OTANA | CI 5345/Zanster | Idaho |
| 9253 | SD 711045 | CI 7631/CI 7632 | South Dakota |
| 9254 | OA 313 | OA 123-236/2/Gemini/CAV 2700/3/Stormont/OA 101-1 | Canada |
| 9255 | OA 338 | Dorval/3/Gemini/CAV 2700/2/5872-1 | Canada |
| 9256 | SD 9095 | Selection from Spear | South Dakota |
| 9257 | LANG | Tyler/Orbit | Illinois |
| 9258 | OK 7222336 | Chilocco/Ora | Oklahoma |
| 9259 | NC 73-9 | Carolee/Fulgrain/6/Fulgrain/5/CI 5106/2/Hajira/Joanette/4/ Atlantic/Clinton/Santa Fe/3/CI 2455 | North Carolina |
| 9260 | NC 73-15 | Carolee/Fulgrain/6/Fulgrain/5/CI 5106/2/Hajira/Joanette/4/ Atlantic/Clinton/Santa Fe/3/CI 2455 | North Carolina |
| 9261 | Ark 99-190 | Nora/Florida 501 | Arkansas |
| 9263 | MENOMINEE | Coachman/2* Marino | Michigan |
| 9264 | 71AB670 | Cayuse/Orbit | Idaho |
| 9265 | 71AB694 | Cayuse/Orbit | Idaho |
| 9266 | CORBIT | Cayuse/Orbit | Idaho |
| 9267 | Y164-13 | Clintford *4/B445 (A. sterilis) | Iowa |
| 9268 | Y247-2 | Clintford *5/B443 (A. sterilis) | Iowa |
| 9269 | Y247-4 | Clintford *5/B443 (A. sterilis) | Iowa |
| 9270 | Y247-25 | Clintford *5/B443 (A. sterilis) | Iowa |
| 9271 | Y248-32 | Clintford *5/B444 (A. sterilis) | Iowa |
| 9272 | Y249-42 | Clintford *5/B445 (A. sterilis) | Iowa |
| 9273 | Y341-41 | Clintford *6/B443 (A. sterilis) | Iowa |
| 9274 | Y341-62 | Clintford *6/B443 (A. sterilis) | Iowa |
| 9275 | Y342-31 | Clintford *6/B444 (A. sterilis) | Iowa |
| 9276 | Y257-31 | CI 8044 *5/B445 (A. sterilis) | Iowa |
| 9277 | Y349-23 | CI 8044 *6/B443 (A. sterilis) | Iowa |
| 9278 | Y336 (Isoline) | Clintford *6/PI 295919 (A. sterilis) | Iowa |
| 9279 | Y337 (Isoline) | Clintford *6/B437 (A. sterilis | Iowa |
| 9280 | Y339 (Isoline) | Clintford *6/B440 (A. sterilis) | Iowa |
| 9281 | Y340 (Isoline) | Clintford *6/B442 (A. sterilis) | Iowa |
| 9282 | Y341 (Isoline) | Clintford *6/B443 (A. sterilis) | Iowa |
| 9283 | Y342 (Isoline) | Clintford *6/B444 (A. sterilis) | Iowa |
| 9284 | Y343 (Isoline) | Clintford *6/B445 (A. sterilis) | Iowa |

| C. I. Number | Name or Designation | Parentage | Source |
|---|---|---|---|
| 9285 | Y344 (Isoline) | CI 8044 *6/PI 295919 (A. sterilis) | Iowa |
| 9286 | Y345 (Isoline) | CI 8044 *6/B437 (A. sterilis) | Iowa |
| 9287 | Y346 (Isoline) | CI 8044 *6/B439 (A. sterilis) | Iowa |
| 9288 | Y347 (Isoline) | CI 8044 *6/B440 (A. sterilis) | Iowa |
| 9289 | Y348 (Isoline) | CI 8044 *6/B442 (A. sterilis) | Iowa |
| 9290 | Y349 (Isoline) | CI 8044 *6/B443 (A. sterilis) | Iowa |
| 9291 | Y350 (Isoline) | CI 8044 *6/B444 (A. sterilis) | Iowa |
| 9292 | Y351 (Isoline) | CI 8044 *6/B445 (A. sterilis) | Iowa |

# Applying for Plant Variety Protection - Oat

Larry W. Dosier, Examiner

Final processing of oat variety applications began when the Exhibit C forms arrived from the printer in March of 1976. The first three certificates were issued on October 27, 1976. Of the five applications still pending as of February 1, 1977, all await action by the applicant.

While the Office and the applicant share a common interest in seeing the certificate issued at the earliest possible date, considerable delay results if the Examiner must request additional information from the applicant.

The following suggestions are designed to ease preparation of the application and speed processing:

1. Familiarize yourself with application requirements in advance. It is time consuming to again grow out the variety to score additional characters. By all means, obtain the Exhibit C and application forms, and keep their requirements in mind while breeding and increase work on the variety is in progress.

2. Read directions carefully. The directions on the new application form (GR-470; January, 1976) have been made much more explicit to eliminate separate requests for information. Follow the new directions for all applications.

Some items which are essential to the application or become necessary to the search for novelty are occasionally overlooked because of the amount of detail necessary to make the instructions comprehensive. The following areas should be given special attention:

a. Application form: (1) Signature, (2) Date of determination, (3) Proper accompanying fee ($500).

b. Exhibit A: (1) Frequency of variants (if no variants have been observed, this must be stated), (2) Evidence of stability (preferably including a statement which states that the variety is uniform and stable).

c. Exhibit B: In comparisons to the most similar variety (see below), the most similar variety must be explicitly stated to be the most similar variety.

d. Exhibit C: (1) The decimal point indicator ( ▲ ) should not be disregarded, (2) Standard comparison varieties are only those in the line preceding Item 3, (3) Rust race susceptibility should not be omitted, (4) Stem rust genes should be included, (5) Character description cannot conflict with that in other exhibits.

e. Exhibit D: Please include (1) the range of lemma color, (2) specific genes for disease resistance.

3. Distinguish characters demonstrating novelty (Exhibit B) of your variety from comparative wording promoting its superiority (which may be listed in Exhibit D). It is possible the same characters will not be involved. Some advances in agronomic performance cannot be objectively analyzed with present techniques.

A novel variety must be distinguished by "one or more identifiable morphological, physiological or other characteristics ,* * * from all prior varieties of public knowledge" [Sec 41 (a) (1), Plant Variety Protection Act]. We are charged with insuring that evidence of this is part of the record when the certificate is granted. The most effective novelty statement is that which states the most similar variety and then differentiates the application variety by use of simple, verified characteristics.

4. Direct inquiries to the Office. In addition to answering questions pertaining to the Act and our procedures, we publish the more pertinent interpretations and changes in our procedures in the Official Journal, also available from the Office. Changes now anticipated will be published as soon as they become effective. Please use our current address:

Plant Variety Protection Office
Grain and Seed Division, AMS,USDA
National Agricultural Library, Rm. 301
Beltsville, Maryland 20705

# Code of Ethics and Proposals for Handling Distribution of Wheat Germplasm

Editor's note: At the meeting of the National Wheat Improvement Committee, held at Lincoln, Nebraska, October 27-28, 1976, a code of ethics and specific procedures for handling distribution of what germplasm were considered. Because this subject is of interest to oat workers, a summary of the minutes of the meeting, furnished by L. W. Briggle, Secretary, appears below.

## Wheat Germplasm Proposal:

B. C. Curtis presented the report from the Wheat Germplasm Committee. The committee had met September 1, 1976, at Denver, Colorado, to develop a draft proposal indicating the level of support needed for a strong small grains germplasm development program. NWIC members feel that a substantially strengthened program is necessary to make the Small Grains World Collection fully useable. The Collection now includes about 70,000 accessions (40,000 wheats) of highly diverse germplasm which is an extremely valuable resource for American Agriculture. The future of our food supply (and in many respects the World food supply) depends upon this material and that yet to be incorporated.

The committee listed seven objectives and/or guidelines for improvement of the Small Grains Germplasm Program:

1. Compile and make retrievable existing data on current entries in the collection.

2. Establish a set of descriptive characteristics to be recorded for each entry in the collection.

3. Collect data on current entries in the collection for which data are not already available.

4. Establish a continuing program to collect data on new entries coming into the collection.

5. Develop a computerized program for printing field book formats, compilation, analysis, and storage of data, and for printing data for publication and distribution.

6. Develop a routine system for distribution of information to research workers on an annual basis.

7. Publish a periodic newsletter giving locations of nurseries, entries included, etc., in order that scientists may plan on-site visits.

Each objective was discussed separately by the NWIC members. Personnel and budget requirements were considered, as was the present Small Grains World Collection physical facility (building which houses the Collection, laboratory, and office space). In the opinion of the NWIC members, a very substantial increase in ARS funds allocated to the Small Grains World Collection program is needed. Added support should include additional personnel, increased operating funds, and a new building.

Considerable discussion centered around how to undertake the task of searching out and compiling data now in existence at various locations, and the even greater task of evaluating entries now in the Collection. Each regional chairman is to survey the wheat research workers in his region to determine existence and suitability of data that are available on any part of the World Wheat Collection.

A motion was made, seconded (Young, Nelson) and passed to retain the NWIC wheat germplasm committee and to add V. A. Johnson as a new member. Another motion was made, seconded (Watson, Nelson) and passed to instruct the committee to attempt to obtain the services of a "coordinator."

Chairman Smith charged the committee with the task of investigating the possibility of raising non-government funds to hire the coordinator who would develop a complete plan and proposal for a massive, relatively short-term effort toward "catch-up" evaluation of the present Small Grains World Collection. The plan would include determination of descriptive characters for each crop species, how many nursery locations would be required and where they should be, method of recording and coding data, and logistics of getting the job done. Included in the comprehensive plan would be development of a budget for Phase 1 (the massive "catch-up" evaluation of the present Collection). An added responsibility of the coordinator would be promotional in nature--he would contact grower and industry groups, foundation, and perhaps governmental agencies other than ARS for the purpose of financing Phase 1.

Concurrent with Phase 1, it was suggested that ARS personnel submit through their own agency a budget proposal for Phase 2, which would be a significantly strengthened program for the continuing collection, propagation, and distribution of all World Collection entries, and evaluation of new entries. Included with Phase 2 would be an ARS budget proposal for a new building to house the Small Grains World Collection.

Wheat Workers Code of Ethics:

N. F. Jensen presented the Code of Ethics in written form for consideration by NWIC. After some revisions were agreed upon, a motion was made, seconded, (Johnson, Young) and passed that the Code be approved by NWIC, that it be referred to each Regional Conference, and that NWIC encourage adoption by each Region. Another motion was made, seconded (Briggle, Taylor), and passed that the Code be included in the Wheat Newsletter each year, and that the second part beginning with "This seed is being distributed in accordance with---," and followed by the 5 specific guidelines, be printed on a separate page in the Newsletter to facilitate

reproduction. NWIC encourages that this part of the statement accompany a seed shipment whenever unreleased seed is distributed. NWIC also encourages distribution of copies to other commodity worker groups, such as the barley workers, oat workers, soybean workers, etc., in case they would be interested in developing a similar code.

WHEAT WORKERS CODE OF ETHICS FOR DISTRIBUTION OF GERMPLASM

The timely interchange of seed or plant materials of unreleased stocks has made a significant contribution to progress in the genetics and breeding of wheat. Historically, this distribution, which is a form of communication between scientists, was almost entirely between workers in the USDA and State Experiment Stations. Broad undercurrents of change in recent years have introduced new elements which today play an increasingly important role. These elements are the development and growth of wheat breeding as a commercial enterprise, the increasing complexity and ingenuity found in the application of genetic principles and breeding techniques to the development of new wheat varieties, and the development in the United States and other countries of a national policy and law governing plant protection.

Mutual interests of all engaged in wheat improvement are fostered by that climate which engenders the greatest freedom of communication and sharing of breeding materials while, at the same time, provides adequate safeguards to the distributor. Such a climate exists and rests on a foundation of trust among breeders created through long years of working together. To maintain this climate through these changing times, and to perpetuate it for the future, the National Wheat Improvement Committee (NWIC) believes that the present moment calls for the establishment of guidelines--a statement of ethics--to express standards of conduct and moral posture to which wheat workers can subscribe.

Guidelines for germplasm exchange must include the basic facts that (1) seeds of unreleased wheat lines are owned, usually by a breeder, who is responsible to his constituency which may be a public or private agency, and (2) distribution exposes the owner and seeds to potential problems and hazards stemming from uses outside these guidelines. Guidelines should recognize the question of equity and provide adequate safeguards that would encourage the sharing of germplasm. The following statement, subscribed to by the NWIC, represents a reasonable system for distribution of seedstocks of unreleased germplasm of wheat:

> "This seed is being distributed in accordance with the 'Wheat Workers Code of Ethics for Distribution of Germplasm' developed by The National Wheat Improvement Committee 10/27/76. Acceptance of this seed constitutes Agreement."

1. The originating breeder, station or company has certain rights to the unreleased material. These rights are not waived with the distribution of seeds or plant materials but remain with the originator for disposal at his initiative.

2. The recipient of unreleased seeds or plant material shall make no secondary distributions of the germplasm without the permission or the owner/breeder.

3. The owner/breeder in distributing unreleased seeds or other propagating material, grants permission for use (1) in tests under the recipient's control, (2) as a parent for making crosses from which selections will be made, and (3) for induction of mutations. All other uses, such as testing in regional nurseries, increase and release as a variety, selection for the stock, use as parents in commercial $F_1$ hybrids or synthetic or multiline varieties, require the written approval of the owner/breeder.

4. Plant materials of this nature entered in crop variety trials shall not be used for seed increase. Reasonable precautions to insure retention or recovery of plant materials at harvest shall be taken.

5. The distributor of wheat germplasm stocks may impose additional restrictions on use or may waive any of the above.

## NEW CULTIVARS

### FIRECRACKER

C. F. Murphy

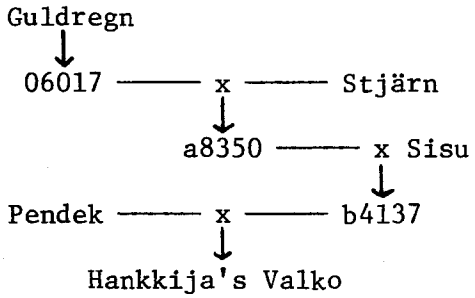
Firecracker winter oat (Avena sativa L.) was tested as N. C. 1373-1 and is listed in the World Oat Collection as C. I. 9224. It was derived from the cross Carolee x T. F. 1012. Carolee is a widely grown release from the North Carolina AES and T. F. 1012 is a French line which was obtained from Dr. K. J. Frey at Iowa State University for its very good straw strength. The cross was made at Raleigh, N.C. in 1968 with the final selection (a single $F_3$ panacle) having been made in 1970. Firecracker was approved for release by the North Carolina AES in the summer of 1976 ( on or about July 4) and Certified seed will be available to farmers for planting in the fall of 1977.

The main attributes of Firecracker are its excellent straw, early maturity and good yielding ability. It is characterized by short height and large seed numbers on dense panicles. The overall appearance of Firecracker is quite unique and while the panicle is dense the seed quality is much superior to that found in a "Milford type" panicle. Firecracker does not have a high level of winterhardiness and is only recommended for the coastal plain environments in this region.

## HANKKIJA'S VALKO

Matti Rekunen

In the fall of 1976, the Hankkija Plant Breeding Institute released a new oat variety for Finland, under the name Hankkija's Valko. the pedigree follows:




Hankkija's Valko has very stiff straw and large grain size. It has a low hull percentage, and consequently is high in nutritive value. It is equal in yield to Pendek and Titus, and has stiffer straw and better grain quality than these varieties. It is intended to replace the old Pendek, which was bred in the Netherlands.

## HARYANA JAVI-114

R. S. Paroda, K. R. Solanki, and B. S. Chaudhary

Haryana Javi-114 is a new variety developed in India that is especially suited for multicut cropping. It is described in detail in another section of this Newsletter.

## MARGAM

D. A. Lawes

The spring oat Margam bred at the Welsh Plant Breeding Station, Aberystwyth, has been accepted onto the National List and added to the National Institute of Agricultural Botany's Recommended List for 1977.

Margam was derived from the cross:

5222 Cn 3/10/31 x (7717 Cn 3/3 x Condor)

and, apart from its high grain yield and short stiff straw, has been developed for its earliness of ripening; it is 2-8 days earlier than other commercial varieties at present available.

On the 1977 NIAB List Margam is the highest yielding spring oat, haveing an average yield of 108% of the control varieties (Leanda and Maris Tabard); it also has the highest ratings for shortness of straw, earliness of ripening and kernel content and top equal ratings for standing power, resistance to mildew and 1000 corn weight. Margam has major gene resistance to races to 2 and 4 and also a moderate degree of adult plant resistance to *Erysiphe graminis*. No particular resistance to *Puccinia coronata* is claimed.

## LYON

D. D. Stuthman, M. B. Moore, P. G. Rothman, and R. D. Wilcoxson

The Minnesota Agricultural Experiment Station has approved the release of Lyon, a spring oat variety. Lyon is a selection from the cross Lodi X Portage and was advanced in early generations by single seed descent. Replicated yield evaluations of Lyon were begun in 1967 and state-wide testing was started in 1972. Lyon was in the Uniform Midseason Oat Performance Nursery for three years, 1973-75, and identified as Minn. 71101.

Lyon has yielded well in Minnesota, about three percent better than Froker and Lodi for the five year period 1972-76. Lyon has lodging resistance equal to that of Froker and Lodi. It has higher bushel weight and groat percentage than Lodi, but slightly lower than Froker. Lyon is about two days earlier than Lodi or Froker and intermediate between the two in height. Lyon has greater groat protein and protein yield than either Lodi or Froker. It has both smut and crown rust resistance, but is quite susceptible to Barley Yellow Dwarf Virus (BYDV).

The seed of Lyon is white, and fluorescent under UV light. The leaves usually have a green-blue color and are droopy. There is some unevenness for height; however, few, if any, panicles are completely above the top of the bulk of the panicles. The overall appearance of Lyon resembles that of one of its parents, Lodi.

## OMIHI

G. M. Wright

Omihi is a new pale brown spring oat released by the Crop Research Division, DSIR, New Zealand in 1976. It was bred at Lincoln from the cross Milford/Rodney//Avon made in 1961, and had its final trials under the designations 185,01/10 and Omihi 10. It has been admitted to the list of Acceptable Cultivars.

Omihi has short, thick, strong straw, a moderately dense unilateral panicle, and plump grain with a thin husk that is liable to be removed in threshing. It has a higher grain yield, and higher protein and oil content, than present New Zealand cultivars when sown in Canterbury in autumn or spring, and should become a leading oat for feed grain and chaff production.

Omihi has field resistance to crown rust and immunity to stem rust in Canterbury. It is resistant to smuts and has useful tolerance to BYDV in New Zealand and Canada.

Sister selections of Omihi have given poor yields in Europe, but a further selection now in its first drilled trial has yielded well in Canada.

## OXFORD

E. Reinbergs

Oxford is a variety of spring oats developed by the Ontario Cereal Project group and tested under number OA 183-3. Oxford can be described as a large, yellow seeded oat with excellent lodging resistance, high yield and wide adaptability in Eastern Canada. It has similar disease resistance to Garry but is more tolerant to B.Y.D. and has less double oats than Stormont or Elgin. Oxford was derived from the cross GA 85 x Clintland 60 x OA 48-54 x Stormont made at the Crop Science Department, University of Guelph, Guelph, Ontario in 1964. On the basis of favourable performance of yield, lodging resistance, seed type, B.Y.D. tolerance and adaptability license for sale in Canada was granted on September 23, 1976. Breeder seed of Oxford is maintained at the Crop Science Department, University of Guelph. In the fall of 1976, under the Cultivar Release Policy for Field Crops, the Ontario Ministry of Agriculture and Food exclusively released 120 pounds of Breeder seed and 1300 pounds of select seed to Stewart Seeds Ltd., Ailsa Craig, Ontario.

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GA 85 = Garry x (Ajax x Erban)
OA 48-54 = (Beaver x Garry) x Clinton

## PENNAL

J. D. Hayes, D. A. Lewis, R. Cook and J. Valentine

Pennal, a winter oat variety bred at the Welsh Plant Breeding Station was granted Plant Breeders Rights in 1976 and has been added to the U.K. National Institute of Agricultural Botany Recommended List of Cereals for 1977.

Pennal was produced by the pedigree method from a cross between 5687Cn 3/7/37, a line closely related to Pendrwm, and Peniarth. It is about 6% higher yielding, about 6 inches shorter and with stiffer straw than Peniarth, the better and at present, most widely grown winter oat.

Pennal is similar in maturity to Peniarth with intermediate thousand grain weight which is slightly larger than that of Peniarth. Its mildew resistance and winter-hardiness is slightly lower than Peniarth, but still relatively high. Pennal has no specific resistance to crown rust or soil-borne oat mosaic virus - two diseases of lesser importance in the U.K. The variety is resistant to stem eelworm.

A stock of seed has been sent to the U.S.D.A. Oat Collection.

## TERRA

R.I.H. McKenzie, E.D. Mallough, J.W. Martens,
D.E. Harder and P.D. Brown

This cultivar was produced by the Agriculture Canada Oat Rust Area Project Group, centered at the Research Station, Winnipeg. It has been under test since 1970, under the accession number RL 2966 and OT 195. From 1972-74, it was tested in co-operative oat tests for 35 station years and outyielded the naked oat check Vicar by 15%. The parentage is (Random x Vicar) x Random. The final cross was made in May 1968 and an $F_5$ line was bulked in August 1969 to form this cultivar.

Terra is a strong strawed, high yielding cultivar that should respond well to good management. It matures 3 days earlier than Vicar. Yields are generally good, approaching those of Random or Hudson when compared on a groat basis. The kernel is large for a naked oat. Terra is susceptible to both rusts and to smut. It appears tolerant to grey-speck.

Terra appears widely adapted across western Canada. However, in Manitoba because of its rust susceptibility, it could suffer considerable loss when sown late. A limited quantity of seed was distributed for planting in the spring of 1976.

## RISTO

Gösta Olsson and Bengt Mattsson

Risto spring oat was developed at Svalöf, Sweden, from a cross between the Dutch cultivar Pendek and the Finnish Sisu. It was first listed on the Official Swedish List of Cultivars in 1970 and was on the market in 1973.

Risto yields the same or higher than Sun II in all districts in Sweden. In the best district Risto outyields Sun II by 11%. Risto is one day earlier than Sun II while there is no difference between them in straw-stiffness. The hectolitre-weight and protein content are somewhat lower in Risto, but the kernel content is higher. Risto has a white kernel with the same 1000 kwt as Sun II.

Compared to Selma, Risto has the same or somewhat higher yield in the best region. However, Risto is in many regions 3-4 days earlier than Selma which may be of great value. Risto is inferior to Selma in straw-stiffness and hectolitre-weight but has a higher kernel- and protein content.

Risto is less damaged by frit fly and barley yellow dwarf virus than Sun II and Selma.

Risto has been tested with good results also in Finland and the Soviet Union.

## SANG

Gösta Olsson and Bengt Mattsson

Sang spring oat was developed at Svalöf, Sweden from the cross (Sv 01771 x Sv 56697) x Condor. It was first listed on the Official Swedish List of Cultivars in 1974 and was on the market in 1975.

Sang is higher yielding than Sun II in all districts in Sweden and on the average it outyields Sun II by 6%. Sang is one day earlier than Sun II. It has very stiff straw and is 20 units better than Sun II in a 0-100 scale. The straw also has good resistance against breaking down after ripening. Sang has a relatively large, white kernel. There are only small differences between Sun II and Sang in hectoliterweight and protein content but the kernel content is 0.8% higher in Sang than in Sun II.

Compared to Selma, Sang has the same yield as Selma in the best districts in Sweden, but on the average for the whole country Selma yields 2% more. Sang is 2 days earlier than Selma and it has remarkably better straw. Sang also has 1.2% higher kernel content and 0.8% higher protein content than Selma.

# VI. PUBLICATIONS

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