Neal Jensen

1964

OAT NEWSLETTER

Vol. 15

April 1, 1965

Sponsored by the National Oat Conference

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

April 1, 1965

Sponsored by the National Oat Conference

Neal F. Jensen, Editor

ANNOUNCEMENTS

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 the 1956, 1960, 1961, 1962 and 1963 Newsletters are available on request.

Plant Breeding Series - Drs. Thurman and Jones have contributed a detailed account of the system in use at Arkansas for this issue. Who will volunteer a write-up for the 1965 issue?

Variety descriptions - It would be helpful if you name or announce a new variety if, in addition to your account in the State report text, you would submit a separate description which could be included under the "New Varieties" section. This section, apparently, is one that is repeatedly referred to and we would like to make it as 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PLEASE DO NOT CITE THE OAT NEWSLETTER IN PUBLISHED BIBLIOGRAPHIES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 it fits a normal journal pattern and 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 outside the oat workers' group. For example, libraries send several requests a year for it and we refuse them (if the Newsletter 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. A recent letter thinks that 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 <u>him</u> rather than the Newsletter. This can be handled by the phrase "personal communication". (Ed.--repeated from 1963.)

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I. CONFERENCE AND REGIONAL NOTES

NEXT NATIONAL OAT CONFERENCE IN EAST LANSING

John Grafius kindly sent the following:

"Michigan State University is pleased to invite scientists interested in oat improvement to attend The National Oat Conference to be held February 9, 10 and 11, 1966 at the Kellogg Center."

ORGANIZATION OF NATIONAL OAT CONFERENCE

Chairman, National Conference -- John Grafius
Acting Secretary -- H. C. Murphy
Editor, Newsletter -- N. F. Jensen
Southern Small Grain Workers Conference -- R. L. Thurman (Chmn.), U. R. Gore and D. T. Sechler, representatives to Conference
North Central Region -- Dale Ray (Chmn.), H. L. Shands (Secy.)
Northeastern Region -- R. Pfeifer (Chmn.), G. C. Kent (Secy.) S. Lund and H. Marshall, representatives to Conference
Western Region -- C. F. Konzak and H. Stevens
Cereal Branch representative -- L. A. Tatum
Oat Section representative -- H. C. Murphy

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II. SPECIAL REPORTS

*** The 1964 Oat Crop ***

by H. C. Murphy, USDA

Oat yields were reduced in 1964 by generally unfavorable weather which delayed spring planting and by localized areas of severe drought, such as in the Northeast. There were also localized areas of appreciable crown rust, stem rust, and BYDV infection. Even so, the fifth highest yield per acre was recorded.

Oat acreage in the United States (and for most of the world) continues to decline. Oats were harvested from 20.4 million acres in the United States in 1964, down 6 percent from 1963, and the smallest since 1882. (USDA-CR-PR2-1. 1964). The sharp decline in oat acreage has taken place during a period of unparalleled increases in average yield and test weight. A record high yield of 45.2 bushels per acre was established in 1963. Seven of the highest average annual U.S. oat yields have been recorded during the past ten years. The 20,419,000 acres harvested in 1964 is in sharp contrast to 42,291,000 acres harvested in 1954.

Year	Yield Bu.	Yield Rank	Harvested acres	Remarks
1964	43.2	5	20,419	
1963	45.2	1	21,683	
1962	45.0	2	22,675	
1961	42.1	6	23,994	
1960	43.3	4	26,646	
1959	37.6	-	28,368	BYDV
1958	44.8	3	31,834	
1957	37.5	-	34,646	Crown rust, etc.
1956	34.5	-	34,984	Drought in Midwest
1955	38.3	7	39,243	
1954	35.4	-	42,291	Some rust damage

A record yield doubtless would have been established in 1959 had the crop not sustained heavy losses caused by the barley yellow dwarf virus (BYDV). The 1959 epidemic of BYDV is described in detail in the Plant Disease Reporter, Supplement 262, 1959. Heavy crown rust infection reduced yields in Illinois, Indiana, Ohio, Texas, and the Southeastern States in 1957, whereas high yields were obtained in most of the North Central region. Severe early season drought damage in the heavy oat-producing Midwest followed by losses caused by heavy rainfall prior to harvest were primarily responsible for relative low yields in 1956.

There is ample evidence that maximum oat yields are not being attained because of almost universal poor stands and lack of adequate fertilization. New stiff-strawed, high-yielding varieties are now available which would allow our farmers, with proper cultural practices, to regularly produce "100 bushels." What the future holds for the oat crop in the United States depends not only upon further improvement by our oat workers but also upon utilization of the full potential we now possess.

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*** Progress Report on Research Toward a Uniform System for Reporting and Computer Processing Cereal Test Data ***

by C. F. Konzak and C. A. Watson
Washington State University
Montana State College

Studies are continuing at Washington and Montana on a system for reporting and processing data from cereal variety trials. We are convinced that mechanical data sorting and analysis can markedly increase efficiency in cereal programs. Results of our experience with uniform procedures and with the translation of data into computer codes strongly suggest that standard descriptions and codes for reporting data may be an exceedingly effective means for communication between scientists studying aspects of the same or similar materials. Furthermore, the coordination of systems that have standard procedures for recording agronomic, pathologic, physiologic, quality, and other types of cereal crop data could increase the effectiveness of the various programs and vastly broaden the scope of this form of communication. The system being developed in Washington and Montana allows for automatic computer analysis or hand analysis of data, and automatic printing of data tables and results of statistical analysis. Variety master cards, prepared only once, are basic to the system. These cards constitute a permanent, readily retrievable source of pertinent information about a variety. These cards might be the same as those used for accession identification data by Plant Introduction and Crop Variety Classification and Maintenance programs.

Research conducted at Washington State University was supported in part by a grant from the Washington Wheat Commission, under Project 175. We wish to acknowledge with gratitude the extensive collaboration of many members of the USDA Research Service, USDA Plant Introduction, State research staffs and International programs during the course of this program. The counsel and assistance from the Computing Center staffs at Washington State University and Montana State College has been vital to this research.

Experiment description cards record information about each experiment, such as design, rainfall or moisture available, harvest date, treatments, soil type and other important information describing conditions under which the experiment is conducted. For the most part this information is not coded because (1) relatively few computer cards are needed even for the complete listing; (2) the fewer codes simplify the system, lend greater accuracy and completeness of records, and require less effort from workers; and (3) computer programing is simplified - decoding is unnecessary and the information is more easily transferred for reports.

The variety master cards are used to prepare both seed storage lists and data cards which are used to record the results of the experiment. At least two data cards are required for each of the smallest distinct plot units that the investigator wishes to identify, i.e., each treatment, replicate, plot of each variety in the experimental design. The two data cards and any other supplementary cards needed for reporting data about a given plot unit are associated by means of a key information section. The key information section includes such information as the harvest year, experiment number, location, plot number, treatment number, replicate number, as well as the variety number and information necessary to identify the kind of crop, for example, wheat, and the type or form (spring or winter), all of which are necessary for identification. Thus, data card 1 carries the key information section, plus a crop class designation needed for card sorting and identification, as well as the variety name as supplementary information. The variety name is needed in the card if variety names are to be entered in field books and summary tables for reports; the remainder of the card is used for experimental data such as pertinent dates and yield, etc. Supplementary data cards carry the key information section for identification and the data on injury responses, such as winter kill, disease, etc., or on other responses, according to standard formats.

The data cards can be used for the printing of field record books, labels, seed bags, etc., in the desired arrangement, thus saving time and labor. Information from the variety master cards and available data pertaining to the specific experiment (key information) are machine punched onto the data cards at the time of field book preparation. The data cards are thus ready for the direct transfer of experimental data from the field record book. Field record books printed with green ink, shading of alternate lines on "Easy-Read" paper may speed recording in the field and transferring of records by key punch personnel. After field data are added to the data cards, the raw data are subjected to machine analysis. During the machine analysis, the raw data are resolved or transformed into averages or forms commonly reported, and the results are automatically punched onto data summary cards. For example, plot yields recorded in grams are transformed to bushels per acre. Tables of the summarized data for reports are automatically produced by merging information from the experiment description and data summary cards.

Coordination of systems used in the allied research programs might be accomplished by: (1) Use of the same descriptions and codes for reporting specific data. The description and coding should follow a standard form and be consistent insofar as possible with a uniform set of principles. As an example, we used uniform criteria to translate the several kinds of plant response data to computer codes. That is, we measured plant responses as injuries; winter kill rather than winter survival, lodging rather than straw strength; and these are reported in percent. Thus, the plants having the lowest percentage of injury or the lowest coded reaction types (where reaction types can be distinguished) would then represent the best breeding material; (2) Use of a single format wherever possible for recording data of common interest. For example, general use of a single reasonably flexible format for reporting data in the field and for computer processing. A tentative format now being used for cereal variety trials in Washington and Montana incorporates some of the desired features; (3) Use of standard key information on data cards and in master card series within and between systems wherever possible so that the data from different programs can be integrated. As an example, the potential cross-reference of records and data between fields of research would be facilitated by the adoption of the same accession or variety master card system. These cards should carry descriptive information, and records of prime importance to all interrelated programs. The use of a standard format for the experiment description would facilitate the recording, help to assure availability of information for the evaluation of products of experiments (such as in the quality studies of wheat and barley), and for comparative studies of pertinent environmental data with varietal response data; (4) Machine evaluation of data according to standard principles. The method of evaluation might differ somewhat according to the nature of the responses or trait evaluated. Responses or traits for which a stable, ideal value or rank is recognized, might be rated relative to this ideal, either in % or other units of 1 to 10. Responses that are relative, or for which no standard or ideal or limit is recognized, might be ranked according to the performance of standard checks or to desirable performance levels of different standard checks. The ranks might use class units in % of the values of the checks. A method used by Gillis, Sibbit and Banasik at North Dakota for machine evaluation of quality traits illustrates this point. In their work, classes designated for each trait are assigned values in relation to the responses of the check variety in each test or location. Values for other varieties are ranked according to classes designated in measurement units by which the values exceed or fall below the check.

In summary, a few of the potential benefits are:

(1) Much duplication of effort by members of different programs could be avoided;

(2) The distribution of and the cost of obtaining pertinent data could be markedly reduced--for example, variety identification and description data cards could be reproduced by one agency so that the information in standard form would be available at a minor cost to all those who had coordinated programs;

(3) With uniform codes, costs of translating data into terms commonly understood would be minimized;

(4) Members of coordinated programs would have access and be able to compare, correlate and analyse a wide variety of information pertaining to descriptions, origins, pedigree, environmental and disease responses, etc., on all collections. Descriptive data, once recorded, would be retrievable at any time;

(5) Cooperation between workers and programs would be facilitated by the lower costs and reduced effort required for duplication and evaluation of information;

(6) A standard system such as proposed could also lead to much needed improvement in uniformity and completeness of note taking, analyses and reporting of data;

(7) Sets of standard computer programs could be developed and made generally available, markedly reducing the costs of processing data.

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*** Soil Type Influences Winter Survival in Oats ***

by F. A. Coffman, USDA

It is well known that fall-sown oats winterkill more seriously on the more droughty western plains than in areas farther east. It is considered that available moisture supply is involved. However, the influence of soil type is less appreciated.

Recently, summarizing data on the survival of oats in the Uniform Winter Oat Hardiness Nursery, a comparison was made of the survival of nine varieties when grown on stations in the West as compared with survival on stations in the East.

For purposes of this comparison the varieties were the same, the stations were located in the same winter (Dec.-Feb.) temperature zone, the altitudes of the stations in the East and in the West were believed comparable, and in their comparison, the soil types were the same in the East and in the West. The results obtained were of interest. They indicated (1) killing was more severe in all varieties in the West over that recorded in the East, but less severe in some oats than in others; (2) as would be expected, killing was more severe in the cooler than in the warmer winter (Dec.-Feb.) temperature zones; (3) altitude did not apparently have any greater influence in the West than in the East, but (4) soil type had a very profound influence.

Obviously, some soils dry out less quickly than others, and the size of soil particles greatly influences the moisture retaining capacity of a soil.

The difference (average for the nine varieties) in killing in the West over that in the East averaged close to 14 percent. However, the increased percent of killing of these varieties when grown on clay soils averaged only 7.4 percent greater in the West over that in the East. The difference in killing on silt soils was almost twice as great (14.0 percent) and on sand or sandy soils about two and one-half times greater (18.2 percent) in the West over that in the East.

Based on killing in clay being 100 percent, then killing on silt soils was about 187 percent and on sandy soils 247 percent greater than on clay in the more droughty West over killing in the more humid East.

These data give what is believed to be a usable index of the influence of moisture, or rather the lack of it, and soil type on the survival of oats. It would be of interest if similar data were available on other winter cereals. In general, it is now believed these data indicate that cold resistance, heat resistance, and now presumably drought resistance are all associated in our winter cereals as differences in killing in more hardy varieties in the West over that in the East tended to be less than in the less hardy winter oats among the nine varieties included.

This observation might also prompt the idea of incorporating winter oat genes into spring oats and other cereals in order to increase heat and drought resistance.

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*** World Gene Bank for Cereal Breeders ***

by J. C. Craddock (USDA) Beltsville
and N. F. Jensen, Cornell University

The gene bank for cereal breeders has been established with the contributions of seed that have been received. Samples of the wheat seed stocks should be available for distribution in time for sowing during the fall of 1965. The effectiveness of this project depends upon the regular contribution of seed from many sources. All plant breeders are invited to participate by contributing surplus seed from F_1 and F_2 plants.

The planting seed stocks are composites made by mixing all the contributions that have similar growth habits. Each year's contributions are blended into the seed stocks remaining from the previous season.

Sufficient seed has been accumulated to establish the following bulks:

1. Spring wheat - seven contributions, 23 pounds.
2. Winter wheat - 12 contributions, 37 pounds.
3. Wheat (unknown growth habit)- 14 contributions, 69 pounds.
4. Barley (unknown growth habit) - two contributions, 13 pounds.

There have not been enough contributions of oats to warrant making a bulk.

The seed stocks for this bank are maintained as a part of the USDA Small Grain Collection. Seed requests and contributions should be addressed to Dr. J. C. Craddock, USDA Small Grain Collection, Crops Research Division, Plant Industry Station, Beltsville, Maryland.

(Ed. note--Dr. Craddock's reference to the impending distribution from the wheat bank offers an opportunity to re-emphasize that (1) This is but the first of many periodic distributions for the future, and (2) Continuing contributions are needed to enlarge the gene pool above what is now present at the first distribution. For oats and barley we have not reached this first level.)

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*** Wild Oat Species Collections ***

by H. C. Murphy, USDA

An intensive program of collecting and testing for rust reaction of wild oat species in Israel is being conducted by Dr. I. Wahl, Mr. A. Dinoor, and associates in the Department of Plant Pathology, Faculty of Agriculture, Hebrew University of Jerusalem, Rehovot, Israel, under a USDA P.L. 480 project. More than one thousand collections of the hexaploid Avena sterilis, tetraploid A. barbata, and A. Wiestii, and diploid A. longiglumis have been made in Israel. Resistance to crown or stem rust has been found by Dr. Wahl and his associates among a number of collections of A. sterilis and A. barbata.

I had an opportunity to spend almost three weeks in Israel in April 1964 reviewing P.L. 480 projects and observing and collecting wild oat species throughout the country, accompanied by Dr. Wahl, Mr. Dinoor, Dr. Daniel Zohary, Dr. Robert Kenneth, and other members of the Hebrew University. Wild oats are present throughout Israel, with A. sterilis being most abundant, followed by A. barbata in northern Israel and A. Wiestii in southern Israel. Rhamnus palaestina, a native buckthorn species, is abundant in the hills of northern Israel. It was not unusual to observe a hillside blanketed with A. sterilis and dotted with R. palaestina bushes. Frequently, the R. palaestina leaves showed evidence of heavy aecial infection and the adjacent A. sterilis plants were heavily infected with crown rust. Considerable variation in reaction to crown rust was usually evident with reactions ranging from highly resistant necrotic flecks through apparent tolerance to complete susceptibility. A balance between the oats and the parasite seems to have been established which generally allows good vegetative and seed production of A. sterilis immediately adjacent to R. palaestina heavily infected with crown rust. In contrast, fields of "Minnesota" (LMHJA) oats in the same vicinity were being severely damaged by crown rust. A. sterilis growing under this selection pressure would seem to afford an excellent source of various levels of resistance to crown rust. Fortunately, I was able to collect seed from A. sterilis plants growing under these conditions. These collections are now being screened for reaction to specific races of crown rust in Israel and the United States. Drs. Wahl, Simons, McKenzie, Fleischmann, and others have reported outstanding resistance to race 264 and other races of crown rust in a number of A. sterilis selections.

The high degree of variability for rust reaction, height, maturity, pubescence, grain size and color, growth habit, vigor, and other characters evident among the A. sterilis populations was unexpected and impressive. These observations would indicate this wild hexaploid species should afford a rich source of new genes not only for disease resistance but for superior yield, grain quality, and other desirable agronomic qualities.

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*** Quaker Oats Grain Improvement Programs in U. S. and Latin America ***

by Dallas E. Western, Director
Grain Development and Agricultural Relations, Quaker Oats

We don't always have complete success every time with our Grain Development Programs. We have little trouble in getting farmers to apply fertilizers and various other chemicals on corn, but you can talk yourself blue in the face, even to some Experiment Stations, and they will continue to grow oats and other small grains the same as they did 30 years ago. At farmer oat meetings, I have outlined in detail how to raise 100 bushels of oats to the acre--then like an echo, "I have been raising oats all my life, and it can't be done." So this last year, we inaugurated an oat-growing project with Vocational Agriculture boys in Eastern Iowa. We figured these young fellows wouldn't know that they couldn't raise 100 bushels to the acre and would do it. There were 32 lads who entered the project. Our theory was right--all participants had yields in excess of 80 bushels; 19 had yields exceeding 90 bushels, and 9 produced more than 100 bushels of oats per acre. The winning yield was 134.8 bushels raised by Dale Tekippe of Fort Atkinson, Iowa. Since we pay these young farmers $1.00 for every bushel of yield over 70 bushels, there will no doubt be an increased number participating next season--news gets around, you know.

In Mexico, we have had phenomenal success, but even here we had one interesting stumble. When we started working there in 1960, at least 98% of all the oats were grown by the Mennonites in the state of Chihuahua. They were growing a very low quality oat developed at the turn of the century. As a result of our oat-testing plots, we sent down a whole carload of two much improved varieties from the States. We gave them the seed to grow and distribute to their neighbors throughout the Colony, which they did. We continue to conduct experimental plots in the area which demonstrate higher yields from new varieties, fertilization and weed control. Even though our control plots yield at least three times more than check plots, our Mennonite friends still have no more than 25% of their acreage planted to new varieties and will try no fertilizer or chemicals for weed control. They are fearful our new varieties will run out and are skeptical of using fertilizers and chemicals because they fear detrimental effects to their soil in future years. Such is only slightly frustrating. What really "pulls the cork," is that all by themselves they find the feeding value of the new varieties much superior when fed to their poultry and livestock. Yep, you guessed it--they keep the new varieties home for feed and deliver to us their old stuff. Our cure is a big, big spread in price.

Fortunately, we have found some very large farm operators nearer to Mexico City who never had raised oats before. With our newly-developed varieties adapted to their area and with a program of fertilization and weed control, these farmers under contract are going to raise most of our oats. They are getting excellent yields--some well over 100 bushels to the acre, and excellent quality. We now anticipate growing all of our Mexican requirements in Mexico and also for some of our South American Mills. I say it is phenomenal because these Mexican farmers, until two years ago, never had grown oats before.

In some South American countries, we also have grain improvement programs. We have had extensive grain testing and breeding programs in Colombia and for Venezuela during the past eight years with no success. We are not able to whip their diseases. In the Argentine, local grain has always been available, but not so in Brazil. Nearly all diseases are prevalent in Brazil, but the rusts are not so virulent as in Colombia. We have uncovered excellent resistance and an extensive breeding program is under way. In our testing plots, we found moderate resistance and adaptability in two varieties, both of which are from Wisconsin; namely Garland and Dodge. Three metric tons of these were sent and planted early in July, the start of their winter, out in the interior of their southernmost state, Rio Grande Do Sul. Small grains must be raised during winter months as summer temperatures are much too hot. In late November, I inspected these fields being multiplied for commercial seed. They were almost ripe and doing extremely well, and will produce yields beyond expectations--125 bushels per acre at least. By 1966, with good luck, we will need to import no more oats in Brazil.

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*** C.I. Numbers and Operation of Small Grain Collections ***

by L. A. Tatum, USDA, Beltsville

Historically, C.I. numbers have provided a unified system of designating strains of small grains as they move from local programs into cooperative uniform tests and automatically into the program of germ plasm preservation through the World Collections.

In earlier years, little thought was given to such matters as "closed" or "open" stock as by general consensus and practice such material was freely available as parental germ plasm to interested breeders. It has always been understood that release of a C.I. accession as a variety for production would be made by a cooperator only with the consent and concurrence of the originating agency or agencies.

More recently, especially as nonpublic agencies became active in cereal improvement, it became evident that more restrictive, explicit, and mutually acceptable guidelines were needed in our handling of C.I. accessions. A first step was the consideration by the various workers' conferences and then publication in the Newsletters of a plan whereby C.I. accessions were withheld from the Collection until named and released as varieties, or until it was reasonably certain they would not make the grade as varieties and, therefore, no longer need be considered as "varieties in process of development." To facilitate simple, orderly, and efficient handling of the material we proposed to let them automatically become part of the World Collection five years after assignment of C.I. numbers upon entry into uniform tests. For those on which a decision had not been reached within five years, provision was made for extending the delay for another three years.

It has been brought to our attention that this procedure is unacceptable to some breeders so we are seeking a satisfactory modification. Our proposal is that material not be given C.I. numbers and included in the World Collections until it can be made available to any or all interested breeders. In other words, nothing except released varieties would move automatically into the Collections and we would not maintain germ plasm with restrictions on distribution. Unnamed material having special merit could be added to the Collection by appropriate "release" procedures. The proposed procedure might eliminate a major source of elite germ plasm in the Collections for it is unlikely that all originators would bother to take positive action to have it included. To partially offset this we would ask uniform test coordinators to systematically inquire of the originating station whether an entry being dropped from the test should be moved into the Collection.

Suggestions about the proposed procedure or alternatives are solicited.

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*** Present Oat Breeding Program in Arkansas ***

by R. L. Thurman and J. P. Jones

Records indicate that the general procedures in making crosses of many winter or fall-sown oats have been to use parents resistant to the current damaging races of crown rust. Some of the sources of resistance appear to represent bio-types. For example, Victoria, Landhafer and Trisperinia. It is somewhat surprising that records fail to indicate back-cross programs to combine these various sources of resistance into one breeding line or variety.

The breeding program at Arkansas was begun by searching for parents which contained several of the previously used sources of crown rust resistance. The two sources were:

1. A line (56-38) from Cokers Pedigreed Seed Company which was later released as Moregrain.
    a. The pedigree: [(Arl x Del) x Trisp x (Bond x Fulg.)] x Victorgrain

2. A line from Dr. Rosen's Nursery, C4-4-5-7-3-4
    a. The pedigree: Lee x Victoria, 2 x Fulwin, 3 x Bonda, 4 x Landhafer

The varieties Victorgrain 48-93 and DeSoto were also used in the crosses with the lines to help determine the combining ability.

Growing the Populations

1. The crosses are usually made in the greenhouse.

2. The F_1 is usually space-planted at Aberdeen, Idaho because of the large number of seed produced per plant.

3. The F_2 is drilled at Stuttgart, Arkansas.

4. The F_3 is usually grown at Aberdeen.

5. The F_4 or F_5 is space-planted at Stuttgart. See Agronomy Journal 52:489, 1960 for procedure. Populations of 50,000 to 150,000 are desired.
    a. Plant selections are based on vigor, lodging resistance, grain quality and similar characteristics.
    b. The plants are dried and threshed.
    c. Five or six seeds from each plant selected are used to determine the general crown rust resistance. This is normally completed in the summer months on this

early generation material. The general procedure involved in testing for crown rust reaction is divided into two phases, early and advanced generation testing. Early generation material is inoculated with a spore composite of prevailing and anticipated rust races with the resistant survivors being continued in the program. Advanced material is tested with a selection of individual rust races to both eliminate escapes and determine the genetic background of the lines.

6. The seed from the plants with resistance are planted in rows the following fall to increase the seed.
   a. If there is an indication of heterozygosity in the plants for the selection characters, several head selections are made in the otherwise superior appearing lines.
   b. Seed are harvested from the selected plant rows (including the heterozygous appearing ones saved). The harvested seed are used in the following manner:
      1). Limited performance trials the following season.
      2). For increase the following season.
      3). To determine the crown rust and Helminthosporium blight reactions of the lines (the Hel. reactions have led to major difficulties in handling of certain segregating populations involving the Victoria genotype).
      4). Some of the seed from each harvested row should be saved and the seeds from all rows bulked for later space plantings for further selection.
   c. Heterozygous lines (see a above)
      1). Agronomic or selection characters. Five seeds are used from each head for crown rust determinations and the remaining seeds from each head are sent to Aberdeen for single short-row summer increases.
         a). Only those rows with plants with high crown rust resistance are harvested - if the others are harvested they are later discarded.
         b). The harvested ones are increased and later entered in the performance trials to replace the bulks.
      2). Crown rust. It may be handled as indicated above for the agronomic characters if the plants have not been destroyed. Another method is to space-plant some of the seed in the fall. The "hardened" plants are moved to the greenhouse and checked for their field reaction to crown rust. The resistant plants are transferred to soil benches to produce seed. The seed are sent to Aberdeen for a summer increase.

Note: The majority of the lines from most of the crosses are eliminated at this point. Critical evaluation for both agronomic and disease characteristics are the bases for the elimination. The best sources of additional breeding material have been the bulk seed under 6 b 4) above. The remnant seed may be grown for additional generations to reduce the heterozygosity before space planting.

A comparison of the offspring from the crosses involving several bio-types have led to superior characteristics when compared to the parent. For examples:

1. Larger and plumper seed.
2. Shorter plants with higher lodging resistance.
3. Higher winterhardiness readings.
4. Broader resistance to crown rust.
5. Resistance to races of crown rust greater than that possessed by either parent.

7. A breeding nursery is maintained. It is used primarily for observation of lines and reselections prior to their increase and processing under points 8 through 12. In reality point 6 could be considered a part of this nursery.

8. The seed of the selected lines are again increased.
   a. Outstanding lines in the limited performance trials are tested again the following year.

9. The outstanding lines from previous years lines are entered in performance trials at several locations.
   a. The superior performance lines are again tested for their disease reactions.

10. The lines showing outstanding promise in the performance trials are increased in three drill-strip plots (approximately 20 x 140 feet in size). The number of such increases usually varies from about 12 to 30. A strip of wheat is used to separate each of the increases.
    a. The plants in the yield trials are harvested in the late morning. The harvested plants are placed in the plot stubble and are tagged as to plot, entry and replication. The untied bundles are carried directly to the Vogel thresher and the plants threshed. The grain from each plot is weighed and the moisture percent is determined. The adjusted weights are used in determining the performance of the lines and which of the drill strip increases to harvest. We sometimes visit performance plots in other states to secure information for use in making the decision on the lines to retain. We also write the breeders in other states for their evaluation of our materials. Dr. Murphy has been very gracious to send us his observations of the lines at other locations.

1). As an example, of the available equipment the Experiment Station owns six large Vogel threshers. Drying facilities for plants and grain are available at Fayetteville and Stuttgart.

b. The increases of the lines showing good performance in the yield trials are harvested. The others are discarded.

1). Single heads are saved for the harvested lines to produce head-rows the following season.

c. If we lack sufficient information for a decision on the disposition they are repeated in the performance trial and increases.

11. The lines showing superior performance the preceding year are grown in two to four acre increases. One to four such increases are grown. Head-rows are also grown.
   a. If not previously entered in Uniform Nursery it is done prior to planting time of this season.
   b. Some of the lines harvested the previous season are repeated in the three drill-strip plots for further observation.
   c. Performance trials are continued at several locations.

12. Any superior line in the previous years 2 to 4 acre increases are sown to field increase with a view of release as a new variety.
   a. Seed from the previous years head-rows are sown in an increase to produce new breeder seed.
   b. Performance trials are continued.

13. The selection for winterhardiness has been very difficult. The use of short-rows in two replications separate the high ones from the low ones.
   a. It was later determined that the use of four rows approximately 12 feet in length and in four replications offers a suitable approach if and when differential killing occurs. The larger plots also offer an opportunity for selection of the surviving plants.
   b. Another approach is to grow several head-rows and select the ones with plants that survive the low temperatures.
   c. Another approach is to space plant the remaining seed from 6 above at Fayetteville or a more northern location and harvest seed from the surviving plants.

14. The present efforts in the breeding program are to: Add other bio-types and to incorporate both stem rust and soil-borne mosaic resistance to the combinations.

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*** Puerto Rico Oat Rust Nurseries, 1964-65 ***

by H. C. Murphy, D. V. McVey, and Marie Prechtl, USDA

The Puerto Rico oat rust nurseries were designed primarily for testing with dangerous rust races that should not be used for testing in nurseries on the North American Mainland. Race 264, the most virulent race of crown rust, exploded in Florida in 1957. It has been widespread, but not epidemic, in the United States since then. Race 264 has been regularly used in Puerto Rico since the first nursery of the current program was grown during the winter of 1957-58. In view of its widespread distribution some northern states started using 264 for inoculating their local rust nurseries in 1964. Virulent races 6A and/or 13A of oat stem rust have been used in Puerto Rico since 1958-59. The extremely dangerous race 6AF, which made up 10 percent of the 1963 isolates and showed a further increase in 1964 (see report by Stewart, et al., in this issue) has been included in the Puerto Rico tests starting with the 1962-63 nursery.

Entries for the Puerto Rico oat rust nurseries are accepted from research institutions throughout North America when parentages indicate a source of resistance to the specific rust races being used. The number of entries accepted from any one institution may be limited depending upon the space available. We anticipate that an appreciable amount of space will be needed during the next few years for testing rather extensive and recent USDA and Canada-Wales wild oat species collections.

The locations, number of entries, and races of rust for each of the Puerto Rico oat rust nurseries grown in 1964-65 were as follows:

Location	Race	No. of entries	Rust
Isabela	264	2,024	Crown
Lajas	6A	1,515	Stem
Mayaguez	6AF	1,565	Stem

M. D. Simons supplied the inoculum of crown rust race 264 for inoculating the Isabela nursery. B. J. Roberts supplied the inoculum of 6A and 6AF for the stem rust nurseries at Lajas and Mayaguez. Supplying adequate, viable, and pure inoculum is a major contribution and vital to the success of the Puerto Rico oat rust nursery program.

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

The number of United States and Canadian cooperators submitting entries, states or provinces participating, and rows of oats grown in each nursery, for the past six seasons, has been as follows:

	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
Cooperators	25	24	21	17	19	11
States and provinces	16	15	18	14	18	10
Approximate number of rows						
Crown rust race 264	5,700	5,002	4,774	3,719	4,830	2,024
Crown rust race 290	5,000	---	---	3,552	---	---
Crown rust race 294	---	4,899	---	---	---	---
Crown rust race 321	---	---	2,964	---	---	---
Stem rust subrace 6A	---	---	2,238	---	---	1,515
Stem rust subrace 13A	1,900	547	---	---	---	---
Stem rust subraces 6A, 13A	---	---	---	1,398	3,025	---
Stem rust subrace 6AF	---	---	---	411	2,640	1,565
Total	12,600	10,448	9,976	9,080	10,495	5,104

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*** Joint Release of Varieties ***

by L. A. Tatum, USDA, Beltsville

In considering joint release of varieties I shall limit my remarks to varieties developed cooperatively by the Agricultural Research Service and one or more State Agricultural Experiment Stations. What is a cooperatively developed variety? In a broad sense there is some degree of cooperation on almost every variety developed by Federal or State workers. This may go back to plant exploration and introduction of germ plasm sources used as parents, and extend on through testing in uniform regional trials, international disease nurseries, quality tests, and local breeding and testing activities in which Federal breeders, geneticists, pathologists, or entomologists participate directly or where Federal funds are used through cooperative agreements or subdivisions of funds with a State employee holding a collaborator's appointment. It seems obvious that some varieties fall into a grey area where doubt exists as to whether the extent of joint efforts makes joint release appropriate. I should like to suggest a few guidelines which, to me, seem reasonable and which I believe are generally recognized and followed: A variety is cooperatively developed and should be jointly released when (a) a locally-based Federal employee participates in breeding and testing the new variety for yield, quality, disease, or insect-resisting characteristics or any other trait; or (b) substantial amounts of ARS funds go directly into the program through cooperative agreements, contracts, or a subdivision of funds.

An acknowledgment rather than joint release seems appropriate when Federal participation consists of furnishing basic germ plasm or services in connection with uniform trials, international disease tests, or routine quality evaluation and screening in a regional or national laboratory.

If doubt exists in particular instances, I suggest discussion or correspondence among those involved to resolve differences in points of view prior to release.

The distinction between release and recommendation deserves comment. Whereas release and recommendation in some States are synonomous, or at least release automatically implies recommendation, the ARS is concerned only with the release aspect. The ARS view is that the responsibility for recommendation rests with State rather than ARS officials.

Perhaps we seem unduly concerned with the formalities and protocol of joint releases. There are several reasons for the importance we attach to it.

(a) Documentation of research achievements and contributions are our most effective means of justifying appropriations and expenditures of Federal funds.

(b) Joint release and accompanying publicity gives credit where credit is due to agencies and individuals.

(c) Orderly and systematic handling of releases helps avoid misunderstandings and contributes toward continued effective cooperation.

(d) Finally, our administrative superiors require it of those of us who work for ARS. Likewise, I believe it is a policy of most Experiment Station Directors. I should like to state that: We in Beltsville have no intention or desire to second-guess or question the judgment of local workers who make decisions regarding the merits of a new variety though we may sometimes have a perspective that makes our advice worth hearing.

What about the mechanics of a joint release? The following in outline is the preferred or suggested procedure that is easiest for us and therefore, tends to expedite action.

(1) A local committee representing the disciplines involved consider the merits of a potential new variety.

(2) If the recommendation is to release, the action, with supporting data, is transmitted to the Experiment Station Director and, at the same time, by the senior ARS employee involved to his Branch Office in Beltsville, through his Investigation Leader.

(3) In Beltsville, a release agreement or announcement is prepared for signature of the Director of the Crops Research Division and the Director of the State Experiment Station. If more than one State is involved, the agreement goes simultaneously to each director. When all have concurred, the document is reproduced and copies sent to each participating agency. Essential points to be covered in the agreement are (1) the name and origin of the variety; (2) identification of the cooperating agencies; (3) brief summary of the more important attributes of the variety; and (4) scheduled dates and plans for publicity and seed distribution

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III. CONTRIBUTIONS FROM OTHER COUNTRIES

AUSTRALIA

*** Observations on Barley Yellow Dwarf Virus Resistance ***

by P. M. Guerin

Barley Yellow Dwarf was prevalent throughout the autumn-sown plots at Glen Gunes during 1964, but it was apparently complicated by other factors.

Excessive rainfall stunted root development of the oats on the retentive black soils where the oats were sown in the autumn

(20th March). The early winter sowing (1st May) did not suffer to any extent as seedling growth was much slower with the low temperatures and room for root development was less critical. The autumn sown oats were also heavily grazed in winter (grazing being the object of sowing oats in autumn). The May-sown plots were not grazed in winter (the seedlings not being sufficiently rooted) but were grazed together with the autumn-sown plots during September. Final recovery of the May-sown plots was excellent with almost no B.Y.D. or symptoms associated with B.Y.D., whereas the March-sown plots were severely discoloured, and suffered stunting and blasting of the panicles.

Algerian, which showed the most intense reddening of the leaves, suffered a comparatively small degree of blasting. Wintok also showed a high degree of reddening but almost no blasting of florets. In general late maturing varieties suffered the most severe symptoms of B.Y.D., namely Klein 69B and Klein crossbreds, Ukraine, Acacia x Lampton crosses, Belar cross and Algerian (even though Algerian showed little blasting), also Cornell which is the latest variety.

In contrast to Algerian, the new late selection of Victoria-Richland x Boppy x Belar (W4606), intended for release in the near future, showed very little leaf reddening but a high degree of blasting. To date I had regarded W4606 as resistant to Barley Yellow Dwarf. An Algerian x W4606 cross might assist here.

Rate of growth due to season and to date of sowing, intensity of grazing and varietal maturity all complicate the picture in assessing resistance to B.Y.D. On top of this a change in the strain of virus itself could cause further complication. Fortunately the variety Fulghum still shows less blasting than any other variety and a rust tolerant selection 871-1G59 (P4318) derived from Fulghum-Garry x Victoria-Richland x Algerian x Fulghum x Victoria-Richland x Sunrise x Fulghum suffered little blasting.

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CANADA

*** Collection of Avena Species from the Mediterranean ***

Reported by F. J. Zillinsky, R. V. Clark and V. D. Burrows,
Canada Dept. Agr. Research Station, Ottawa

F. J. Zillinsky and T. Rajhathy of the Ottawa Research Station were accompanied by J. D. Hayes of the Welsh Plant Breeding Station, Aberystwyth on an extensive collecting expedition in the Mediterranean Region. Collections were made in Libya, Crete, Greece, Turkey, Italy, Sicily, Sardina, Corsica, Tunisia, Algeria, Morocco, Gibraltar and Spain and required about 9 weeks to complete. The primary objective of the expedition was to collect seed of annual species related to cultivated oats. Seeds of species related to wheat and barley were also obtained. Altogether about 560 collections were made representing the following species: A. clauda (35), A. pilosa (15), A. ventricosa (2), A. longiglumis (11), A. barbata - hirtula (301), A. sterilis (176), A. byzantina (21). The separation of A. barbata from A. hirtula was not attempted in the field. This is being done on the basis of chromosome number in the laboratory.

The earliest collections were obtained in Libya where much of the seed had already shattered by mid-April. The latest collections were made in central Spain in mid-June but at the higher elevation the species were just beginning to ripen. As collecting was restricted to a very short period early in the season only the fall germinating early maturing types were collected in most regions. No attempt was made to collect the later maturing or spring germination types. No plants of A. sativa, A. fatua, A. strigosa, or A. abyssinica were found although A. strigosa seed was recovered in 2 samples of commercial seed.

It appears that the species A. ventricosa is well on the way towards extinction. Only a single population was found just east of Oran in Algeria on a barren dry plateau above the cliffs near the sea. Two other diploids A. claude and A. pilosa are more widely distributed.

The surviving populations are greatly influenced by a variety of selection pressures in their natural habitats. The habitats varied from extreme drought and overgrazing in North Africa to very moist fertile valleys of Sardinia and Italy where the influence and competition from diseases, insects and other plant species is very evident.

Our immediate concern is to increase seed of the collection so that screening for disease resistance and other characteristics can be started and seed can be made available to other research workers. It is expected that this material will be a useful addition to the collection already maintained by the U.S.D.A. and the collection made by Dr. H. C. Murphy in Israel in 1964.

Barberry Eradication in Eastern Canada

A barberry eradication program was launched in Ontario and Quebec in 1964. The costs of this program are shared equally by the federal and provincial governments. The Ontario program concentrated on the barberry areas in the eastern section of the province. Spray rigs and survey crews started operating about mid May and continued until the end of October. A mixture of 245T in fuel oil was the main herbicide used until mid summer at which time Tordon-water solution was substituted until late in the season. The effectiveness of the different herbicides will be evaluated in 1965.

About 26,000 acres were systematically sprayed. This area included all of the most heavily barberry infested land and also neighbouring less densely infested areas. The large spray rigs will be used primarily in western sections in 1965, using smaller units and knapsack sprayers to clean up areas of eastern Ontario missed in 1964.

Along with this program a study is being made to determine the effect of the eradication of barberry on the incidence of stem rust in Ontario. Surveys and collections are made several times during the season to determine the source of inoculum, the rate of spread of stem rust and the prevalence of different races.

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*** Aneuploids in Common Oats ***

by R. C. McGinnis
Department of Plant Science, Univ. of Manitoba
Winnipeg, Manitoba

The program to produce a complete monosomic series in Garry is progressing. Thus far it appears that 11 of the possible 21 monosomics have been isolated. Of the remaining 10, four should be easily identified on the basis of chromosome morphology. These are the three satellited chromosomes (Nos. 1, 2 and 8) and the longest one of the complement (No. 3). The major source of these aneuploids has been through screening large populations for their natural occurrence and from progeny of X-irradiated, pre-flowering panicles. In total 108 monosomics and 18 double monosomics are available in Garry, about half still to be identified. It is hoped that some of the remaining monosomics will be found in this material.

Attempts are also being made to produce a monosomic series in Rodney. By irradiation, 60 monosomics have been induced but studies to identify them are only now underway.

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*** Contribution from Canada Department of Agriculture Research Station, Winnipeg, Manitoba ***

by G. Fleischmann, R.I.H. McKenzie and G. J. Green

In Western Canada both the acreage and the average yields of oats were lower in 1964 than in 1963, which resulted in a total production of only 206 million bushels. The production was 100 million bushels less than in 1963. The greatest reduction occurred in Northern Saskatchewan where a severe spring and summer drought caused a large reduction in acreage sown and in crop yield. Average yields in Manitoba, Saskatchewan and Alberta were 44.6, 36.8 and 40.5 bushels respectively.

The prevalence of race 6AF of oat stem rust increased sharply in Canada from a mere trace in 1963, to 21 per cent of the isolates from totally susceptible varieties in 1964. This race can attack all commercial varieties and potential varieties under test in Canada. Rosen's Mutant and C.I. 5844-1 were resistant and moderately resistant, respectively, to all the cultures of race 6AF obtained in 1964.

Despite the sudden increase in prevalence, race 6AF caused little damage. Oat stem rust developed too late in the season to harm the bulk of the oat crop, but late fields of Garry and Rodney in the Red River Valley had infections of up to 50 per cent.

Garry and Rodney are the main varieties in the rust area of Western Canada and they are resistant to race 6F which was predominant.

Light to moderate crown rust infection occurred in 1964 on commercial oats in Southern Manitoba. The rust developed after most of the crop had headed so that losses were negligible except in late-sown fields. As in previous years, almost all crown rust isolates identified across Canada attacked the commercial varieties Garry and Rodney. Virulence on Landhafer and Santa Fe was again demonstrated in more than half the physiologic races isolated in Western Canada. The number of isolates attacking Trispernia and Bondvic increased substantially from the previous survey.

In Eastern Canada isolates from aecia yielded a greater number of races than a comparable sample of isolates from uredia. The ratio of races to isolates in cultures from aecia was 1 : 1.8, while uredial cultures had a race to isolate ratio of 1 : 3.0. Several new races of crown rust were discovered during this study, the majority of which originated from aecial material.

Results of a two-year study of yield reduction in Garry oats subjected to natural crown rust epidemics in this area indicated that losses were greater than those anticipated by field observations, and, that the yield of late-sown Garry was reduced as much as 25% by moderate crown rust infection.

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JAPAN

*** Cytological Studies of the Wild Tetraploid Oats from Nepal ***

by I. Nishiyama and M. Tabata
Lab. of Genetics, Kyoto Univ., Kyoto, Japan

Four strains of a wild tetraploid species of *Avena* from Nepal have been studied cytologically. The original plants of these strains, designated as 28-12, 28-13, 28-14 and 28-15, were collected at different locations at an altitude of 2,000-3,000 meters and identified as *Avena strigosa* Schreb. subsp. *barbata* (Pott) Thell. var. *typica* Malz. subvar. *genuina* (Asch. et Gr.) Malz. (Nakao and Mori 1956). However, these strains differ from the standard strain (28-1) of *A. barbata* Pott maintained at our laboratory in some plant characteristics, particularly in showing erect culms and broad blades.

The examination of the microsporocytes of the Nepal strains showed that usually 14 bivalents are formed at metaphase I, although one quadrivalent is observed in about one-third of the cells (Table 1).

In the F_1 hybrids between the Nepal strains and the standard strain, one to four quadrivalents (both in ring and chain configurations) were observed in most of the cells (Table 1). The most frequent pairing configurations were $3_{IV} + 8_{II}$ in one cross (28-1 x 1049) and $2_{IV} + 10_{II}$ in the other three crosses. Besides the multivalent formation, no other irregularity was found. The fertilities of the F_1 hybrids were only slightly lower than those of the parents in spite of the formation of multivalents in meiosis. The cytological data suggest that the Nepal strains are different from the standard strain by probably two or three chromosomal interchanges.

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Table 1. Chromosome pairing in the parental strains and the F_1 hybrids

Parents or F_1s	Cells	Univalents	Bivalents	Trivalents	Quadrivalents	% Seed set
28-1	50	0-2(0.12)*	13-14(13.92)	0 (0)	0 (0)	98.9
28-12	50	0-2(0.04)	12-14(13.16)	0 (0)	0-1(0.30)	90.4
28-13	50	0-2(0.18)	12-14(13.04)	0-1(0.02)	0-1(0.42)	92.1
28-14	50	0-1(0.02)	12-14(13.24)	0-1(0.02)	0-1(0.36)	93.8
28-15	45	0-2(0.27)	11-14(13.13)	0-1(0.04)	0-1(0.33)	89.1
28-1 x 28-12	50	0-2(0.42)	6-11(8.40)	0-1(0.34)	1-4(2.44)	67.5
28-1 x 28-13	50	0-3(0.30)	6-12(9.74)	0-1(0.10)	1-3(1.98)	78.2
28-1 x 28-14	50	0-2(0.16)	6-12(9.52)	0-1(0.08)	1-4(2.14)	88.7
28-1 x 28-15	50	0-2(0.44)	6-13(9.98)	0-2(0.28)	0-4(1.70)	93.1

* Average values in the parentheses.

*** Contribution from Hokkaido National Agricultural Experiment Station ***

by T. Kumagai and S. Tabata

The weather of 1964 during oat growing was the worst in ten years. The ratio of the yield to the average of 1954-1963 was only 53% in Zenshin, 41% in Honami and 57% in Victory No. 1, respectively. It has been thought that the shortage of sunshine and low temperature especially at the time of heading and ripening were the main causes. It is certain that these meteorological factors have badly influenced on the ripening of grains and have largely contributed to the increase of sterile spikelets.

Crown rust has not yet been the important disease of oats in Hokkaido. The damage of rust has been much limited in some parts of Hokkaido. In 1964, however, crown rust was virulent and the oat crops sustained heavy losses.

The major problem confronting oat breeding in Hokkaido is to breed the varieties with high yield and standing ability. For this purpose the English varieties, such as Milford and S. 172, have been used as gene sources. Seven hundred twenty-eight lines of the F_{4-5} generations were tested and 99 lines were selected on the basis of lodging resistance.

The survey of the varietal difference on northern mosaic virus was conducted on space-planted nursery. Northern mosaic virus was less prevalent this season than in recent years in our nursery, despite the widespread occurrence of the virus in Tokachi area, eastern Hokkaido. The response to the virus were classified as follows:

Resistance	
High	A. strigosa (2.9), Nortex (3.4)
Medium	Clinton(6.6), Fulghum (6.9), Fleur du nord (6.9)
Low	Strubes Gelb (10.6), Zenshin (9.7)

Note: the rate of infection was given within parentheses.

Winter hardiness was successively tested using 157 varieties of winter type. The following winter varieties indicated the superiority: R 6620 (Russian variety), Gris d'Houdan, Lee Cold proof, Ballard, Virginia Grey, C.I. 5364, P.I. 177818, P.I. 178473, P.I. 177785.

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NEW ZEALAND

*** Another Dwarf Oat ***

by G. M. Wright, Crop Research Division,
Lincoln, Christchurch

Many dwarf oats have been reported (N. F. Jensen in the Oat Monograph, D. Peier *et al.* in Crop Science, 4, 427). One appeared at the Crop Research Division in 1961-62, in the progeny of an F_2 plant selected from the hybrid Steel X Pendex 2X Forward X 39.01 3X Victoria X ^{4}Onward. In this plot, one of 126 F_3's from the cross, seven plants were stunted, and their ears emerged about seven weeks later than on the 13 or more normal plants.

The few ears on the dwarf plants were sterile, and eight of the 11 progenies grown in 1962-63 from normal plants segregated in a reasonable approximation to a 3 : 1 ratio (204 : 54). Classification of further (F_5) progenies in January 1964 was upset by effects of BYD virus, but from 13 to 15 out of 24 segregated. Some viable grains were produced late in the season on 12 of the dwarf plants, and all 229 plants grown from these were dwarfs.

Including two progenies from normal F_5 plants grown in 1964-65, 37 progenies of normal plants from segregating plots have been grown, and from 23 to 25 of these segregated. Dwarfing in this material appears to be inherited as a single-locus recessive character.

"Grass-clump" wheats have been found to develop more normally in growth chambers. When the 24 F_5 oat progenies were grown in a growth chamber with 18 hours fluorescent and 24 hours incandescent light per day, the temperature being close to 75°F during the fluorescent period and dropping a variable amount at "night" (probably never below 60°F), all plants had a normal growth habit, but of the progenies which segregated in the field, about a quarter of the plants in the growth chamber were between one and two weeks later than the rest in ear emergence, and although the panicles appeared normal they produced no grain.

The reductions in growth and fertility shown by the oats with this recessive character are thus dependent on light and/or temperature effects. The reduced fertility is more characteristic than the dwarfing. All the field sowings have been made in the autumn, and the response to spring sowing will be investigated.

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IV. CONTRIBUTIONS FROM THE UNITED STATES: U.S.D.A. and STATES

*** ARIZONA ***

Oats for Hay in Arizona

by A. D. Day and R. K. Thompson (Tucson and Mesa)

Small grains can be used to produce high quality hay during the winter months in southern Arizona. An experiment was conducted over a 2-year period (1963 and 1964) at Mesa, Arizona to compare hay yields from oats, barley, and rye. The experimental design was a Randomized Block with four replications. Markton oats, Harlan barley, and Elbon rye were the varieties used. The grains were planted in October and the hay was harvested at the full-bloom stage of growth three inches above the ground level. The recommended cultural practices for growing small grains for hay in southern Arizona were used in this study.

The average oven-dry hay yields from Markton oats, Harlan barley, and Elbon rye are presented in Table 1. Oats produced 6.24 tons of oven-dry hay per acre. The hay yields from barley and rye were 38 and 40% less, respectively, than the hay yield from oats. Oats appear to be the most desirable small grain for hay production during the winter months in southern Arizona.

Table 1. The average oven-dry hay yields from Markton oats, Harlan barley, and Elbon rye harvested at the full-bloom stage and grown at Mesa, Arizona in 1963 and 1964.

Variety and crop	Yield in % of Markton oats
Markton oats	100
Harlan barley	62
Elbon rye	60
Yield of Markton oats calculated in tons per acre	6.24

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*** CALIFORNIA ***

A Crop Ecology Problem in California

by C. A. Suneson, U.S.D.A. (Davis)

In a climate where it never rains from June into October, disease perpetuation is greatly influenced by the irrigation and cropping practices during that period. Hence the recently expanded sugar beet acreage in California, and more particularly the part sown late and overwintered, is likely to intensify the foliar and virus diseases in our cereal crops. These beets commonly follow immediately after a grain crop. Generally not all of the residue seeds, particularly the principal weed (A. fatua), are destroyed by irrigation and cultivation. Some then become overwintering hosts for diseases such as the rusts and BYDV. The number and distribution of such hosts influences the speed of disease spread the following spring. In 1964 we had a very threatening disease situation in mid-winter, but the worst spring drought since 1939 saved us. For 1965, several dispersed plants of A. fatua with heavy stem rust infections were found in mid-October.

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*** FLORIDA ***

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

Oat acreage continues to decrease in Florida while rye and wheat acreages are increasing. According to a recent survey approximately 80% of the 85,000 acres of oats in Florida are either completely grazed or turned under for green manure while an additional 15% of the acreage is grazed prior to harvesting for grain. Suregrain was the most popular variety, being grown on 41% of the reported acreage.

Grain yields were low in many areas of North Florida for the 1963-64 crop season due both to disease problems and extremely dry weather during March and April. Soil-borne mosaic virus did extensive damage to oats on the North Florida Experiment Station Farm for the first time. Isolated mosaic symptoms had been noticed in 1962 but damage was minimal. Floriland was the most mosaic tolerant of the varieties recommended in Florida at the present time. Florad and Radar 2 were ultra-susceptible.

In the fall of 1964 oat seedings have been complicated by almost continuous rainfall which has accumulated totals for the year in some areas ranging up to 47 inches above normal. Erosion and nutrient leaching have been serious problems. Temperatures, however, have been unusually high through most of December and January and vegetative growth has been abundant. Crown rust also has been rampant with severe infections noted at Quincy in mid-December. This is the earliest a crown rust epidemic has been observed in at least the last 5 years. Rust has been observed on Suregrain which would indicate the presence of race 264 or a similar race as well as other more common races. Helminthosporium avenae also has been very prevalent.

A new variety, Florida 500, is being released in 1965 and is described elsewhere in the Newsletter. It probably will replace much of the Suregrain and Moregrain acreage in Florida.

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(Florida)

by H. H. Luke (Gainesville)

Due to beautifully warm weather, crown rust is rampant throughout the Gainesville area, particularly on material that was planted early by some of the dairymen. Several samples of heavily infected material, supposed to be the Moregrain variety, have been brought in. If this is Moregrain, then it would appear that Race 264 is widespread in this area and will undoubtedly be moving north during the early Spring.

Crown rust was first observed here on December 18, 1964, and infections probably have been around since late fall. This is the earliest infection of crown rust observed in this area in the past 10 years.

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*** GEORGIA ***

by U. R. Gore (Experiment)

The oat acreage harvested for grain continued to decline in 1964. However, as a dual purpose crop in middle and south Georgia oats provide both grazing and grain. A total of 1731 acres of oats were grown for registered and certified seed. This should provide seed for most of the 135,000 acres grown in Georgia.

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(Georgia)

by Darrell D. Morey (Tifton)

Small grain grazing has been excellent in South Georgia this winter. Moisture conditions have generally been good and temperatures have favored early growth of forage.

Little crown rust has been reported by mid-January, but conditions are favorable for cereal rusts in South Georgia. Inoculum from Florida and lower South Georgia could cause a serious outbreak of crown rust if the weather continues mild. Aphids have been plentiful and scattered, small areas of "red-leaf" (BYDV) are now evident in South Georgia fields. A lack of nitrogen in many oat fields will soon be corrected by top-dressing. As of January 25, 1965 the prospects for the oat crop in South Georgia appear to be good.

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*** IDAHO ***

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

Even with a late wet spring which delayed planting about three weeks, excellent yields of oats were obtained in Idaho. Most varieties headed later than usual and generally were shorter. No diseases were reported in the state and red leaf symptoms were very infrequent.

In the Aberdeen irrigated nursery, which includes the Uniform Northwestern entries, Park was the high yielding variety while C.I. 7588 yielded best in a similar nursery at Twin Falls. C.I. 7588 was developed by F. A. Coffman from the multiple cross, (Cleo x Garry) x [(Bonda x Hajira-Joanette x Santa Fe) x Mo. 0-205]. It is scheduled for release to certified growers in 1966. Outstanding attributed of C.I. 7588 are high yield potential and excellent resistance to lodging under irrigated production.

The selection program for increasing kernel weight is showing progress. Although lines with high kernel weight are easy to select, they are usually mediocre to poor in yield. In 1964 there was some evidence that this apparent association can be circumvented by intensive selection.

Breeding work is being continued on developing varieties with increased yields, straw strength, groat percentage, and protein content plus better resistance to red leaf.

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*** ILLINOIS ***

by C. M. Brown, H. Jedlinski, M. C. Shurtleff, W. O. Scott, and W. D. Pardee (Champaign-Urbana)

Oats produced a state average yield of 50 bushels per acre in 1964. This is the lowest yield since the severe barley yellow dwarf year of 1959 and is 7 bushels below the record 1963 yield. There were some reports of high yields from individual fields, 80 to over 100 bushels, but these high yields were far less frequent than in 1963. Unfavorable weather conditions undoubtedly accounted for some of the reduction in yield in 1964. Heavy March rains throughout most of the oat-growing areas of Illinois held up planting for several weeks. Most of the oats were seeded late and then ran into dry weather. Stands were often poor and straw was generally short. Diseases also caused minor damages in some areas.

The acreage of oats harvested in Illinois continued its decline with only 1,123,000 acres harvested for grain in 1964. The acreage and yields per acre for the past several years follow:

Year	Acreage Harvested (000) A	Yield Bu/A
1955	3,195	56
1956	3,041	46
1957	2,751	38
1958	2,724	55
1959	2,233	40
1960	1,898	51
1961	1,634	56
1962	1,320	53
1963	1,416	57
1964	1,123	50

were grown for registered and certified seed. This should provide seed for most of the 135,000 acres grown in Georgia.

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(Georgia)

by Darrell D. Morey (Tifton)

Small grain grazing has been excellent in South Georgia this winter. Moisture conditions have generally been good and temperatures have favored early growth of forage.

Little crown rust has been reported by mid-January, but conditions are favorable for cereal rusts in South Georgia. Inoculum from Florida and lower South Georgia could cause a serious outbreak of crown rust if the weather continues mild. Aphids have been plentiful and scattered, small areas of "red-leaf" (BYDV) are now evident in South Georgia fields. A lack of nitrogen in many oat fields will soon be corrected by top-dressing. As of January 25, 1965 the prospects for the oat crop in South Georgia appear to be good.

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*** IDAHO ***

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

Even with a late wet spring which delayed planting about three weeks, excellent yields of oats were obtained in Idaho. Most varieties headed later than usual and generally were shorter. No diseases were reported in the state and red leaf symptoms were very infrequent.

In the Aberdeen irrigated nursery, which includes the Uniform Northwestern entries, Park was the high yielding variety while C.I. 7588 yielded best in a similar nursery at Twin Falls. C.I. 7588 was developed by F. A. Coffman from the multiple cross, (Cleo x Garry) x [(Bonda x Hajira-Joanette x Santa Fe) x Mo. 0-205]. It is scheduled for release to certified growers in 1966. Outstanding attributed of C.I. 7588 are high yield potential and excellent resistance to lodging under irrigated production.

The selection program for increasing kernel weight is showing progress. Although lines with high kernel weight are easy to select, they are usually mediocre to poor in yield. In 1964 there was some evidence that this apparent association can be circumvented by intensive selection.

Breeding work is being continued on developing varieties with increased yields, straw strength, groat percentage, and protein content plus better resistance to red leaf.

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*** ILLINOIS ***

by C. M. Brown, H. Jedlinski, M. C. Shurtleff, W. O. Scott, and W. D. Pardee (Champaign-Urbana)

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1963	1,416	57
1964	1,123	50

The leading varieties in acreage for 1964 were Newton, Goodfield, Clintland 60, Nemaha and Clintland. Newton has been the leading variety in acreage since the severe barley yellow dwarf year of 1959. Although Newton has performed well in all years, much of its increased acreage following the 1959 season must be attributed to its BYD tolerance. The percentage acreage of several varieties in Illinois during the past five years is as follows:

Variety	Percent of Total Acreage Planted				
	1960	1961	1962	1963	1964
Beedee	--	--	1	1	1
Bonham	3	3	2	2	2
Clintland	25	18	12	10	7
Clintland 60	--	3	6	6	8
Clinton	3	2	3	4	4
Goodfield	--	4	10	9	12
Minhafer	9	9	5	5	3
Nemaha	12	10	11	10	8
Newton	39	42	41	42	39
Putnam 61	--	--	--	1	2
Shield	--	1	2	2	3

New Variety

The new variety Brave that was described in the 1963 newsletter is being distributed to certified seed growers for growing in 1965.

The Disease Situation

It is of considerable interest and concern that oat smuts are becoming consistently more prevalent each year in Illinois on Victoria type resistant germ plasm. Collections made in commercial oat fields, especially in Newton and Garry, had as much as 30 per cent of smutty panicles. Collections were screened by Dr. C. S. Holton and found to be of the Victoria type, capable of inducing 95 per cent smut on the Atlantic differential. Perhaps it would be of value to explore the possibility of using "Horizontal Resistance", which is not race-specific in addition to the race-specific "Vertical Resistance", as called by Van der Plank.

Downy mildew on oats continues to appear in Illinois. It was found in a field of certified Andrew oats at Fairmont, Illinois, with an incidence of approximately ten per cent. A few scattered infections were also observed on Newton in other parts of the state.

Barley yellow-dwarf virus disease was of some importance in southern Illinois. In other parts of the state, although present, it was not a limiting factor in production. Helminthosporium avenae, crown and stem rust, and bacterial blights were observed in localized areas, however, they were of relatively minor consequence.

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*** INDIANA ***

by F. L. Patterson, J. F. Schafer, R. M. Caldwell,
L. E. Compton (Breeding, Pathology and Genetics),
R. K. Stivers and O. W. Luetkemeier (Varietal testing),
and M. L. Swearingin (Extension) (Lafayette)

The 1963 Season

A cold, wet planting season, causing poor stands, and a very dry May were unfavorable to good oat production. The acreage in oats continued a sharp decline to an estimated 348,000 acres in 1964. Average yield was estimated at 44 bu./A as compared to the record high 62 bu./A in 1963. Losses from diseases were low.

Oat Varieties

Clintland 60 continued as the leading variety, replacing some more of the acreage of Clintland and Clinton 59. The variety survey of the Statistical Reporting Service and the certified seed production figures are:

Variety	First season of production	1964 acreage (%)	Certified seed (acres)
Clintland 60	1960	25.8	698
Clintland	1955	14.6	-
Newton	1957	13.6	247
Goodfield (Wis.)	1960	13.1	328
Clinton 59	1949	9.4	-
Putnam 61	1962	9.2	387
Putnam	1958	7.8	-
Clintland 64	(1965)	-	710

Clintland 64 was in its initial year of seed production in the hands of certified seed producers. Garland from Wisconsin has also been added to the recommendation list of Goodfield, Newton, and Putnam 61. Norline and Dubois are the recommended winter oats.

Tippecanoe Distributed

About 3000 bushels of initial release Foundation seed of Tippecanoe spring oats are being distributed to seed producers in Indiana in the spring of 1965. Tippecanoe was described in the 1964 Oat Newsletter and also in Purdue Research Progress Report 161.

New Releases

Release of Purdue 541413-8-1, C.I. 7679, and Purdue 5328A3-4P-2, C.I. 7463, has been approved. The names Tyler and Clintford have been proposed. Both were developed at Purdue University in cooperation with the U.S.D.A. and have been tested for several years in the Uniform Midseason Performance Nursery. They are scheduled for initial release in 1966.

Nullisomic Oats

Research was continued with a Clintland 60 sib nullisomic oat. The breeding behavior was described (see Lafever and Patterson in publications). The 20-chromosome gametes are fully functional and the nullisomic is moderately vigorous.

A possible system for using aneuploids to produce commercial F_1 oats was proposed (see Lafever and Patterson in publications). Early estimates had suggested about 1% selfing and 12% cross pollination of nullisomics in the field.

Research in pollination was continued in 1964. In a replicated experiment with 10 different pollinators, selfed seed on nullisomics was about 8.3% and cross pollination (corrected for selfing) was about 11.4%.

In a second experiment F_2 nullisomics were somewhat superior to the Clintland 60 nullisomic for seed set under open pollination.

Response to Population and Nitrogen

Indiana oat yields are believed to be limited mainly by low populations, inadequate nitrogen, and weeds. With the stiff-strawed types now available both populations and nitrogen level might be increased.

Response in yield to population and nitrogen increase were almost entirely lacking due to the drouth in May.

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*** IOWA ***

by K. J. Frey, J. A. Browning, M. D. Simons,
K. Sadanaga, R. Grindeland, L. Micheal (Ames)

Precision from Yield Test Mechanization

During the past 15 years, most cereal breeders have adopted some type of mechanization for conducting rod-row yield trials. Prior to 1953, all Iowa oat yield trials were planted with funnel seeders and harvested with sickles. In each year since 1952, we have planted about 3/4 of the oat yield trials with a tractor-mounted seeder which permitted sowing 4 rows from one seed packet. Since 1955, all tractor-seeder sown plots have been harvested with a two-row cutter mounted on a National tractor.

Initially, we mechanized the seeding and harvesting operations only to save time, labor and money: however, we have received, as a by-product, increased experimental precision. The mean coefficients of variability for grain yield, associated with the different degrees of mechanization are presented in table 1. For the 16-year period (1947-63), the mean C.V. for plots sown with funnel seeders and harvested with a sickle was 11.4%, whereas for the 9-year period (1954-63) the mean C.V. for plots that were mechanically sown and harvested, was 8.1%. When the mechanized and non-mechanized methods were compared for a common 9-year period the C.V.s were 8.1% and 11.3%, respectively. In the 2 years when the plots were sown mechanically and harvested with a sickle, the mean C.V. was 9.3%.

Table 1. Coefficients of variability for oat-grain yields from rod-row plots

Year	Methods of planting and harvesting					
	Funnel planter + Sickle harvest		Tractor planter + Sickle harvest		Tractor planter + Mechanical harvest	
1947	15	12.0	-	-	-	-
1948	14	11.8	-	-	-	-
1949	14	10.3	-	-	-	-
1950	15	10.3	-	-	-	-
1951	10	12.3	-	-	-	-
1952	15	10.8	-	-	-	-
1953	4	13.0	9	9.0	-	-
1954	4	11.2	8	9.7	6	6.7
1955	4	10.0	-	-	11	7.4
1957	4	10.4	-	-	11	9.5
1958	3	9.7	-	-	8	6.6
1959	4	12.9	-	-	13	8.3
1960	3	11.0	-	-	10	9.2
1961	5	13.1	-	-	12	8.9
1962	5	11.6	-	-	10	9.2
1963	3	12.0	-	-	10	7.2
$\bar{x}$ (total)	122	11.4	17	9.3	91	8.1
$\bar{x}$ (common yrs.)	35	11.3	-	-	91	8.1

It appears that both mechanized planting and mechanized harvesting contributed to the reduction in coefficients of variability. The reduction from mechanizing both operations was 30%. It is possible, that change in plot shape and size may have contributed somewhat to the C.V. reduction. With hand planting a plot consisted of 3 rows each 15 feet long, with the center row being harvested for yield determination: with mechanized planting a plot consisted of 4 rows each 8 feet long with the 2 center rows being harvested for yield. Thus, the harvested areas were 15 and 16 square feet for plots planted with non-mechanized and mechanized equipment, respectively. However, we believe that most of the reduction in C.V. resulted from the uniform way that plots are treated with the mechanized procedure.

Vigor of Oat Seedlings from Seeds from Plants Rusted

During the past few years considerable work has been carried out at the Iowa Station to develop methods of measuring the quantitative effect of crown rust infection on oats. Investigations of seedling vigor published by Dr. Grabe of the Iowa State University Seed Laboratory suggested that seedling vigor of oat seed might be used to estimate the relative effect of crown rust on different strains of oats. A preliminary investigation of this possibility was carried out in cooperation with Dr. Grabe in 1964. A field fungicide trial furnished seed from plots that ranged from being virtually free of crown rust to some in which crown rust damage was obviously severe. Seed samples were germinated under standard conditions, and both shoots and roots were measured at the end of six days. In all, some 1200 measurements were made. Unfortunately when the data were summarized, little relationship was evident between crown rust severity and seedling vigor. This is difficult to understand in view of the well established relationship between crown rust and such seed characters as weight and density. It is possible that modifications of the seedling testing procedure might be developed that would differentiate seed from rusted and non-rusted plots or from tolerant and non-tolerant strains of oats.

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*** KANSAS ***

by E. G. Heyne, James Lofgren, E. D. Hansing, and Wayne Fowler

The 1964 Kansas oat crop was seeded at the normal time but under dry conditions. Droughty conditions prevailed till harvest. There were no serious disease problems in 1964. Oats were harvested from 330,000 acres, the production was 9.9 million bushels, the second smallest production since records were started in 1880.

The trend in reduction of oat acreage continues with an increase in soybean acreage. Oats are no longer considered essential in Kansas in a rotation system for a change from a row crop to fall seeded alfalfa.

Most farmers' fields of winter oats were winter killed. The winter oat nurseries at Mound Valley, where the winter oat acreage is located, and at Manhattan were nearly 100% killed. This could be partially explained because of the dry fall and late emergence. At the Hutchinson field in South-Central Kansas, where soil moisture at seeding time was satisfactory, nearly all the winter strains survived 100%. In the Hutchinson plot experiments, Cimarron and Arkwin yielded 62 bushels per acre while the spring varieties yielded 30 bushels. This indicates the potential value of winter oats for Kansas if sufficient winter hardiness is available. Since 1950 Wintok winter oats has been included in winter barley variety tests at Manhattan. Every year there have been some surviving plants and in all but two seasons there has been enough seed to replant the test. The four replications at Manhattan varied greatly in winter killing confined within a very small area, indicating that moisture conditions at planting and establishment of stands may play an important part in winter survival other than cold temperatures.

Spring oat trials indicated no promising varieties for Kansas even though CI 7674, Bond x Rainbow 2 x Hijira x Joanette 3x Landhafer 4x3 Andrew, exceeded the recommended Kansas varieties in yield and test weight, however it was about five days later to head.

The present recommended spring oat varieties for Kansas are Andrew, Mo. 0-205, Minhafer and Tonka, and the winter varieties, Cimarron and Arkwin.

Seed Certification. The acreage of oats inspected for certified seed production by the Kansas Crop Improvement Association rose slightly in 1964. 271 acres were approved in 1964, compared with 153 the previous year and 105 in 1962. Tonka and Neal, both new to the Kansas certification program, were the most popular varieties. These were followed by Andrew, Minhafer, and Mo. 0-205. Arkwin was the only winter variety inspected.

In 1964, Kansas adopted the policy of making certification service available on any variety eligible for certification by a member agency of the International Crop Improvement Association, regardless of the status of the variety so far as recommendation by the Agricultural Experiment Station.

Mr. Max A. Urich resigned as assistant secretary of the Kansas Crop Improvement Association in November in order to devote full time to graduate study.

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*** MICHIGAN ***

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

The 1964 season was characterized by drought in June and early July. This makes the second year in a row where severe drought in the early part of the summer caused reduction in yield of small grain. Both years were inconsistent with the normal rainfall pattern which historically shows peak rainfall in June.

Diseases were not important but real concern has developed over the cereal leaf beetle. This insect has not been contained in its original area of introduction (Southwestern Michigan) despite rather heroic measures by the Bureau of Quarantine. It's obvious that the insect will spread to other states and that adequate control measures must be developed.

To date the Entomology Departments of the USDA and Michigan State University have done a fine job of investigating the life cycle of the insect and in establishing means of control with insecticides. Irradiation and biological control are also being investigated. The Michigan State Department of Agriculture and the Bureau of Plant Quarantine are also active in the effort to control this insect.

Our part in the program, i.e., control through plant breeding, has passed through the initial phases of screening for resistance. This too has been a cooperative effort with many people, and agencies working to make the screening possible. Special thanks are due to Joe Craddock for putting up the seed and to Ev Everson and Bob Gallun for organizing the nursery.

We enclose a list of varieties of oats which appear to have resistance. Further screening of these varieties will take place next year. If, however, you wish to do something now, Pat Murphy joins me in suggesting that you make one backcross to your adapted varieties and carry the progeny in bulk. In this way several crosses could be carried with very little extra work and thus in the event of a breakthrough by the insect you will at least have something to start with.

As yet, we have no methods for screening in the laboratory. The Entomology Department is working on this but until then we are relying on field infestation.

At present, and please do not hold me to this, it looks as if it will be necessary to spray in the initial stages of invasion. Since several predators including the spotted lady bird beetle do exist, we hope that resistant varieties and predators will hold the damage in check.

The entomologists tell me that winter barley may escape damage if planted early in the fall. Winter wheat seems quite tolerant under field conditions but winter oats (my observation) are quite susceptible.

Information on spring wheat has been obtained and will, I'm sure, be made available through Bob Gallun and Ev Everson.

Oat Selections Resistant to Cereal Leaf Beetle

Cl	Row	Cl or Pl	Source
Fulghum	69	907 1+	Virginia
Diamond Hulless	1157	2640 1+	Canada
Early Miller	1528	3269 2	Scotland
Tedere no. 277	1529	3270 2*	Italy
Pusa Hybrid X-27	1596	3442 2*	India
	1706	3786 1+*	Poland
Levie	2121	4666 2	Georgia
Coker B1-48-67	2269	4866 2	South Carolina
Schlagler Original	2304	4906 2	Austria
Abegweit	2317	4970 2*	Canada
379/47	2356	5040 2	Wales
Sturdy	2424	5117 2*	South Carolina
Columbia Clinton	2617	5630 2*	Illinois
Landhafer x(Mindo x H-J)	2861	6914 2*SW	Florida
S.A. 15	4088	244473 2*	Brazil
S.A. 23	4094	244479 1+**	Brazil

*Suggested parents for immediate use.

Score 1-5, 1 resistant.

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*** MISSISSIPPI ***

by Paul G. Rothman
(Delta Branch Experiment Station, Stoneville)

Total oat acreage in Mississippi declined sharply during 1964. The planted acreage was down 40% over the previous year. Unrestricted wheat planting and an extensive fall drought were factors largely responsible for the decline. Despite the unfavorable weather conditions in the fall, timely spring rains helped produce excellent grain yields. Average per acre yields in 1964 were recorded at 45 bushels per acre, quite an increase from the previous year's 29 bushels per acre.

Diseases were not a major problem in the State in 1964. An unusually heavy epidemic of stem rust developed in the oat nursery for the first time in several years.

Dr. Spas S. Ivanoff, for many years the State Oat Breeder at Mississippi State University retired on June 30. He has been appointed Visiting Professor of Biology at Belhaven College in Jackson, Mississippi where he is still carrying on with his research. Dr. Donald H. Bowman formerly on the Small Grains Project at the Delta Branch Experiment Station has left the project to do full time research on Rice Breeding and Production Project at this Station.

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*** MISSOURI ***

by J. M. Poehlman, Charles F. Hayward, Gerry L. Posler, Paul H. Hoskins, Thomas D. Wyllie (Columbia); and Carl Hayward (Mt. Vernon)

Missouri oat acreage further declined to a record low of 310,000 acres in 1964. Temperatures were near normal and moisture slightly above normal during the growing season, resulting in an excellent state average yield of 38.0 bushels per acre. In tests at Columbia, crown rust infection was extremely heavy while stem rust and smut occurrences were almost negligible.

Breeding work in spring oats is presently being concentrated on the improvement of Nodaway to give wider adaptation and increased disease resistance. CI 7805, which has looked very good in the 1962-64 Uniform Early Oat Performance nurseries is being considered for possible release.

Winter oat yield trials at Columbia produced excellent yields, chiefly due to mild winter temperatures. Work is being continued in winter oats to combine disease resistance with the hardy strains that have survived past cold winters at this location.

Personnel Item

Dr. J. M. Poehlman, now stationed in India, serving as an advisor to the Director of Research at Orissa University of Agriculture and Technology, Bhubaneswar, Orissa, India is scheduled to return to duties here in August.

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*** NEBRASKA ***

by D. D. Warnes (Lincoln)

The oat acreage in Nebraska continued to drop in 1964. The very dry spring was the main reason why farmers were hesitant about planting oats and this dry spring also caused failures for many farmers that did plant oats.

A new oat variety is being released in 1965 in Nebraska. Santee has been tested in state and regional nurseries as CI 7454, Clinton x [(Victoria x Hajira - Banner) x Victory]. Santee is a short, early, stiff strawed, high yielding spring oat. In Northeastern Nebraska, where it is primarily adapted, it has had yields comparable to the high yielding later maturing varieties grown in that area. Minnesota and South Dakota are participating in the release of Santee oats.

Neal oats, the variety released in 1963, continues to perform well and seed has been increased and should be available in quantity to all who wish to plant it in 1965.

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*** NEW YORK ***

by Neal F. Jensen (Cornell University, Ithaca)

The following persons at Ithaca contributed to the oat improvement project: L. V. Crowder, J. N. Rutger, G. H. Willis, D. Sajnani and N. Al-Mohammed (Plant Breeding), G. C. Kent, L. J. Tyler, W. Rochon and C. Leonard (Plant Pathology).

Production of oats in New York remains well above the half million acres per year level. Yield levels continue a slow rise and this is expected to continue with shorter varieties.

Tioga will become commercially available for the first time for the spring of 1965. Its outstanding characteristics are shorter, more lodging resistant show. Its per acre yields have been relatively lower than Niagara, Orbit and Garry.

Orbit is scheduled for first commercial release in the spring of 1966.

The paint conditioner shaking machine described in Crop Science (see Publications) has been filling a much-needed place in our processing procedures. All of our nursery samples are processed through this equipment using a standard time (usually 4 minutes for yield nurseries). Special, smooth-rim, heavy gauge metal, 1-gallon pails have been made; these require no top, the screw-down clamp serving as the top (a layer of rubber was attached to the surface of the bottom clamp).

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(New York)

Non-Mercurial Formulations Reduce Oat Smuts

by W. F. Crosier (Cornell University) Geneva, N. Y.

In 1955[1] mercurial seed treatments were reported as reducing, rather than eliminating, oat smuts incited by spores mechanically applied to moistened seeds. The index of control increased as the storage period of the treated seeds was lengthened.

In 1963,[2] a non-mercurial formulation, Chemagro 4497, was stated to volatilize sufficiently to penetrate oat seeds and hence to kill mechanically-protected spores of Ustilago spp. (oat smuts). In 1964, the Chemagro Corporation provided a group of coded formulations for evaluation and comparison with compound 4497.

The Chemagro compounds and several from other suppliers were applied to artificially-inoculated seed of Anthony, States Pride and Vanguard oats. The rates of application were 1.5, 1 and 0.5R (recommended rates). Seeds were also treated indirectly, through fume action only, by enclosing non-treated oat seeds with four volumes of treated heat-killed seeds held in screw-top jars. The storage period was 18 days.

As shown in Table 1, several non-mercurial compounds, Bayer 50749, Chemagro 2635, 4497, 4537 and 4663, and Hooker 1591 were nearly as fungitoxic as the mercurials in reducing the difficultly-controllable oat smuts. It is conjectured that anyone of the formulations listed in Table 1 would eliminate oat smuts that arose through natural field inoculation in the highly-resistant varieties available today.

1/ Crosier, W. F. 1955. Mercurials unable to kill mechanically-applied smut spores. Nat. Oat Newsl. 6:30.

2/ ______________. 1963. Seed treatments for oats. Nat. Oat Newsl. 14:23-25.

Table 1. Control of oat smuts by direct and indirect treatment with mercurial* and non-mercurial formulations.

Material placed on seeds		Percent of smutted panicles when seed treatment was			
Name or Code number	1R rate oz/bu	Direct application 1-1/2R	1R	1/2R	Indirect or fume action
Bayer 50749	1.0	1.2	2.5	2.6	2.7
Chemagro 2635	1.0	1.2	2.9	3.1	-
" 4497	0.5	1.0	1.1	0.9	0.6
" 4537	0.5	1.0	1.6	2.6	1.4
" 4645	0.5	1.8	4.3	6.3	9.1
" 4649	0.5	0.8	1.3	1.7	0.7
" 4663	0.5	3.1	3.8	4.6	6.2
Ceresan L*	0.5	2.0	2.8	3.3	7.9
Ceresan 1966*	0.5	0.9	1.6	1.9	8.2
Hooker 1590	1.0	2.7	3.6	4.8	13.0
Hooker 1591	1.0	2.3	3.2	4.6	11.0
M. salts MMH-A*	0.75	1.2	2.2	4.5	-
Morton 209*	0.5	1.1	3.6	4.2	6.8
" 219*	2.1	1.1	2.1	5.9	-
" 266*	1.5	0.8	2.1	3.5	5.8
Pittsburgh S2*	0.75	3.3	5.4	6.2	6.9
Stauffer 242*	0.5	2.5	3.2	4.1	7.0
" 271*	0.5	1.8	4.6	6.0	7.2
Check	0	11.	12.	11.	13.

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(New York)

Condition of Oat Seedstocks in New York State in 1964

by W. F. Crosier and E. C. Waters
(Cornell University) Geneva, New York

A critical examination of both dry and germinating seeds failed to reveal any unusual fungal or disease condition. In both the 1963 and 1964 crops scab (*Fusarium* spp.) was the only organism to seriously injure seedlings in the germinator or to merit consideration as a field disease. With only 3 exceptions no treated seed lot carried *Fusarium* spp. whereas about 21 percent of the non-treated ones contained 0.5 to 3.2 percent of *Fusarium*-infected seeds.

Alternaria tenuis vegetated on 99 percent and *Epicoccum* spp. on 53 percent of the non-treated samples. These fungi were infrequently present in treated lots probably because a few seeds escaped contact with the mercury treatment.

As in previous years, Septoria avenae had existed in many seed lots but was dead at the time the samples were examined. Black-stained seeds were found in 9.1 percent of the treated samples placed in the germinators. As shown in Tables 1 and 2 occasionally 50 to 70, and in one instance 90, percent of the seeds in a sample developed black Septoria stains during germination.

The incidence of mercury poisoning was quite low in 1964. No chemical injury was observed in 79 percent of the red-colored and in 94 percent of the non-colored ones. No sample developed more than 4 percent of chemically-injured seedlings.

(Table 1, page 47; Table 2, page 48)

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*** NORTH CAROLINA ***

by C. F. Murphy, T. T. Hebert, D. M. Kline (USDA),
M. F. Newton and Marilyn Holton (Raleigh)

Production

The 1964 State average yield of 42.0 bu./A. was a record for North Carolina. This is a 35% increase over the 1963 yield of 31.0 bu./A. The 5-year average is 35.8 bu./A., 17% below the 1964 record. Acreage continued to drop, however, with 146,000 acres being harvested in 1964. This compares to 150,000 acres in 1963 and a 5-year average of 281,000 acres.

Breeding

Several very promising lines were yield tested for the first time in 1964. These lines were selected in an effort to incorporate higher test weight, stiffer straw and equal, or better, hardiness and disease resistance in the high yielding "Carolee type" (high seed number). The most promising lines appear to combine high yield potential with extremely stiff straw. Further testing is being conducted.

Disease Losses

Each year an estimate is made of the disease losses that

Table 1. Signs or symptoms of seed-borne diseases of oats in seed being processed for planting in 1964 or 1965

Name of variety	Percentage of seed lots in each classification: Treated samples with stated percent of Septoria-discolored seeds*					Non-treated samples with seeds or seedling affected by		
	0-2	3-10	11-25	26-50	51-90	Alternaria tenuis	Epicoccum spp.	Fusarium spp.
1963 Crop								
Clinton	65	31	4	0	0	100	0	0
Garry	30	28	17	18	7	100	60	7
Niagara	8	36	36	20	0	100	29	29
Oneida	45	46	0	9	0	92	36	29
Orbit	0	50	50	0	0	-	-	-
Rodney	57	14	22	7	0	97	31	16
Russell	25	42	9	20	4	96	37	4
Others	29	39	13	17	2	100	29	17
All lots	29	34	15	18	4	100	50	11
1964 Crop								
Bee Dee	0	0	50	50	0	-	-	-
Clinton	81	12	7	0	0	100	0	6
Garry	59	20	21	0	0	100	75	28
Niagara	0	20	0	0	0	100	100	0
Oneida	60	40	0	0	0	-	-	-
Orbit	0	0	0	100	0	100	0	0
Rodney	75	25	0	0	0	-	-	-
Russell	25	25	50	0	0	100	100	40
Others	0	50	0	0	50	-	-	-
All lots	62	18	11	7	2	100	71	22

*The treated samples for 1963 and 1964 respectively consisted of 75 and 100 percents of red-stained (liquid mercurials) and 25 and 0 percents of non-colored (dry mercurials). The percentages of red and non-colored samples respectively in each chemical injury group (percents of seedlings exhibiting mercury poisoning) were: for the 1963 crop; no injury, 76 and 94; trace to 0.8%, 17 and 2; 1 to 1.8%, 3 and 0; 2 to 2.8%, 2 and 1 and at least 3%, 2 and 3, and for the 1964 crop (red-stained only), no injury, 79; trace to 0.8%, 16; 1 to 1.8%, 4 and 2 to 2.8, 1.

Table 2. Fungi on oat seed lots sold in New York State in 1964

Name of variety	Percentage of seed lots in each classification							
	Treated samples with stated percent of Septoria-discolored seeds*					Non-treated samples with seeds or seedlings affected by		
	0-2	3-10	11-25	26-50	50+	Alternaria tenuis	Epicoccum spp.	Fusarium spp.
Clinton	65	35	0	0	0	-	-	-
Garry	61	26	5	3	5	100	35	30
Niagara	42	31	7	13	7	-	-	-
Oneida	83	17	0	0	0	100	15	0
Rodney	59	17	8	8	8	100	50	25
Russell	41	36	4	14	5	100	45	12
All lots	56	26	5	8	5	100	44	34

*A red-dyed mercurial was present on 84% of the samples, a colorless mercurial on 8% and the remaining 8% was not treated. No phytotoxity was caused by the colorless mercurials. Chemical injury in the red-dyed lots was observed as: no injury in 86%; trace to 0.8% in 12; 1 to 1.8% in 1 and 2 to 3% in 1 percent of the samples.

occur in oats in North Carolina. Table 1 shows the estimates for the last 10 years. Yearly loss estimates for the previous 5 years have been published (Plant Disease Reporter 38:887-889. 1954). The barley yellow dwarf virus appears to be the most serious disease problem in oats in this state, with the soil-borne mosaic virus ranking second in importance. Helminthosporium avenae caused considerable damage during the early part of the ten-year period, but has decreased in importance in recent years. Smuts were found to cause appreciable losses in only 2 years of the last 10. The rusts, which are the major disease problems in many oat-growing regions, are of only minor importance here. During the past 15 years losses from crown rust were estimated to be 1% in one year with only trace amounts or none being recorded in the other 14 years. Stem rust has occasionally been found on a few plants late in the season, but has not been observed in amounts sufficient to cause a reduction in yield.

Table 1. Disease loss estimates in oats in North Carolina 1955-64.

Disease or Pathogen	Percentage loss in potential yield in crop harvested in:									
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Barley Yellow Dwarf Virus	-	-	-	-	5	2	5	3	4	1
Soil-Borne Oat Mosaic	1	1	1	1	2	3	3	2	2	2
Helminthosporium avenae	3	2	7	1	2	1	1	t	t	t
Smuts	1	t	1	t	t	t	t	t	t	t
Crown Rust	t	t	1	t	t	t	t	t	t	t
Others[a]	1	1	12[b]	3[b]	3[b]	1	1	1	1	1
Total	5	4	22	5	12	7	10	6	7	4

a/ Includes blights, root rots, diseases of undetermined causes and trace amounts of diseases listed.

b/ Barley Yellow Dwarf Virus probably accounted for a large portion of these losses which were placed in the "undetermined" category before evidence for BYVD was obtained by transmission experiments.

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*** NORTH DAKOTA ***

by David C. Ebeltoft (Fargo)

1964 Season

Quite often, these days, we see reports which state that the acres devoted to oats is diminishing. This does not seem to be true in North Dakota.

A recent preliminary report of the U.S.D.A. Statistical Reporting Service gives the following information:

	Acres harvested		Yield per acre	
	Ave. (1958-1962)	1964	Ave. (1958-1962)	1964
Oats	1.76 million ac.	2.0 mill.	34.5 bu/ac	43.0 bu/ac

On further investigation we note that Montana and Florida, the only other states, also report a gain during the same reporting periods.

Rust

This season was such that crown and stem rust did not do serious damage but no variety was completely free of stem rust. Based on findings in the rust nursery here and the report made by the Cooperative Rust Laboratory at St. Paul, Minnesota, North Dakota, too, had Races 6F and 6AF.

Oat Variety Trials

At the following stations:

Station	Location
Langdon	Far North and East
Fargo	Central and extreme East
Minot	North and Central
Dickinson	Far West

the varieties listed were outstanding for yield. Lodi, Ortley, Russell and Burnett. Burnett and Ortley were consistently highest in test weight.

Breeding Program

Two lines with Ajax X Ransom in the parentage will be increased this summer with plans to share further increase in 1966.

We have incorporated Avena fatua into some breeding lines through the use of Dr. Suneson's "Sierra". We are selecting for fertile tertiary florets thereby hoping to increase yield.

New Varieties

North Dakota shared this season in the increase of Brave. It was not exciting for yield, as was expected, but had excellent test weight.

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*** OHIO ***

by Dale A. Ray (Columbus)

Oat Production and Research in Ohio

1964 Season and Production

Heavy rainfall in March and early April delayed oat seeding or caused loss of stands with drowning and soil crusting. Considerable acreage intended for oats was diverted to other crops seeded later in the season. Favorable weather conditions prevailed from mid-May through mid-July and a good oat crop resulted. Severe lodging caused by strong winds accompanying thundershower activity did occur in oat fields which were not harvested before August.

The 659,000 acres of oats harvested in 1964 represented a decline of 15 per cent from the 1963 figure and nearly 30 per cent less than the average oat acreage for the previous 5-year period. The state yield of 55.0 bushels per acre was about 1.5 bushels above the previous 5-year average but 10.0 bushels below the 1963 record.

Winter oats seeded to limited acreage in southern Ohio was eliminated following drought conditions after seeding and low winter survival.

Many diseases of oats were evident in local areas during the growing season but did not have any major influence on production. Barley yellow dwarf, Septoria, halo leaf blight, and crown rust were observed in minor incidence on susceptible varieties. Certain oat stands apparently were damaged from the residual effect of low-volatile chemicals applied for weed control in the preceding corn crop.

Oat Varieties

Clintland 60 continues to be the most widely grown oat variety in Ohio. Clintland 60, Dodge, Garland, Goodfield, Putnam 61, and Rodney have been recommended for 1965.

Oat Investigations

The effects of lodging in oats on the morphology and the distribution of mineral elements in the plant were the subject of the Ph.D. thesis presented by D. S. Bains.

The oat breeding program in progress emphasizes backcrossing and selection for early, stiff-strawed materials from parentages designed to incorporate the major genes for crown and stem rust resistance. The severe winter loss in the winter oat nursery has provided natural conditions for attention to selection for improvement in winter survival.

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*** OKLAHOMA ***

by C. L. Moore, A. M. Schlehuber, B. R. Jackson
H. C. Young, Jr. and E. E. Saari

Production

Conditions in 1964 were generally favorable for oat production in most sections of Oklahoma. Losses from winterkilling were small because of the mild winter; however, dry conditions at heading caused reduction in grain yields in many areas. Production almost doubled the 1963 figure but was well below the 1958-1962 average. 8,294,000 bushels were produced on 291,000 harvested acres. The planted acreage continued to decline as only 91 per cent of the 1963 acreage was planted. The predominating varieties of winter oats in Oklahoma are Cimarron, Bronco and Arkwin and probably in that order.

Winter oats are not used entirely for grain production in Oklahoma. In a "normal" year only about 50-60 per cent of the oat crop is harvested for grain. A sizeable percentage of the acreage is used exclusively for some type of forage production, i.e., grazing, hay or silage.

Breeding

The most significant development in the breeding nurseries appears to be an improvement in straw strength and seed characteristics. The most promising lines are from the crosses Stanton Str. 1 Sel. X Tonka and Cimarron X Tonka. The mild winter did not produce information on the level of winterhardiness in these stocks; however selections were made under extreme winter conditions in 1963.

Crown Rust

The oat varieties currently in commercial production in Oklahoma are all susceptible to most culture of crown rust. An attempt is being made to establish whether any of these varieties have an appreciable level of tolerance to crown rust by inducing epiphytotics in the field. Also, 278 selections with winter habit of growth from the World Collection of Oats have been planted in cooperation with Dr. I. M. Atkins at the Beeville and Prairie View, Texas substations. Evaluation of these oat selections for any type of field resistance, or tolerance to crown rust will be made.

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*** PENNSYLVANIA ***

Winter Oats

by H. G. Marshall (USDA)

Conditions were generally unfavorable for winter oat production in Pennsylvania for the third consecutive year. Severe drought during the fall of 1963 resulted in delayed germination and poor establishment of fall seeded small grains in many areas. The winter of 1963-64 was not as severe as the previous two, and winter survival was relatively good in most areas. However, the recovery of winter oats was slow in the spring, and grain yields were reduced by severe drought during May and June.

Winter oats are currently recommended only in southcentral and southeastern Pennsylvania. Unfortunately, no data is collected in the state concerning winter oat acreage and production, but the sighting of a winter oat field was a rare occurrence during 1964. Farmers have been discouraged by severe winter-killing in the crop during recent years, and a significant improvement in winter hardiness is needed if winter oats are to resume the upward trend in acreage which prevailed under more favorable conditions during the 1950's.

Winter survival was good in winter oat breeding nurseries which were located in southern Pennsylvania during 1964, but grain yields were reduced by droughty conditions. There were no varieties included in advanced tests which significantly outyielded the recommended variety Norline (C. I. 6903), but several were at least equal to that variety. Of these, C. I. Nos. 7500 and 7881 appeared to have the most potential under Pennsylvania conditions. The former variety has equaled Norline in yield and survival in advanced tests conducted over the past 5 years and has good straw strength. Dubois has yielded an average of 11 bushels per acre less than Norline and C. I. 7500 during the same period of time. Only limited data is available for C. I. 7881, but it is of special interest because it is a few days earlier in maturity than most hardy oats when grown under Pennsylvania conditions.

Several outstanding selections which had survived as head rows in a severely winter-killed nursery during 1963 (ca. 90% of the rows were eliminated as well as check rows of Norline and C. I. 7481) were increased at Warsaw, Va., during 1964 and advanced to preliminary yield tests. A total of 174 of these selections were classified for cold resistance during November by means of the crown freezing technique described in the 1963 Oat Newsletter. Seventy-two of the lines were significantly more cold resistant than Norline (.05 level), and only 8 were significantly less cold resistant. Thus, most of the selections which survived under the severe conditions were equal to or better than Norline for cold hardiness.

Almost complete winter-killing occurred in nurseries at the main location near University Park for the third consecutive year, but scattered plants in replicated plots of several bulk populations yielded sufficient seed for generation advancement. Most of the outstanding populations were in the F_5 generation and traced to plants which had survived the previous two severe winters. It is anticipated that the severe winter-killing has generally increased the level of winter hardiness. Recent controlled freezing tests have shown that the cold resistance of the majority of the populations has significantly increased from the F_3 to the F_6.

A graduate student, Mr. Fred Muehlbauer, has completed a cytological study of several autoetraploid Avena strigosa x A. hirtula and A. brevis x A. hirtula hybrids, and is currently writing his M.S. thesis. Mr. Muehlbauer is a 3/4-time assistant on the winter oat project and is supported by funds from the N. E. 23 Regional Project.

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*** TEXAS ***

Texas Agricultural Experiment Station in Cooperation with the U. S. Department of Agriculture

by I. M. Atkins (USDA and TAES), Paul E. Pawlisch, J. H. Gardenhire (Denton), K. A. Lahr (Chillicothe), M. C. Futrell (USDA), C. D. Hobbs (USDA) and R. A. Kilpatrick (USDA)

The Texas oat crop was not damaged by winterkilling in 1964 in contrast to the severe losses of 1962 and 1963. However, spring drouth caused heavy abandonment and grazing to maturity. From 2,098,000 acres seeded, only 800,000 acres were harvested. Good late season recovery resulted in a 30 bushel average yield and production of 24,000,000 bushels, very near the 5-year average. Owing to the very dry spring, the rusts were of minor importance in production.

The (Fulwin-Lee-Victoria x Red Rustproof) x (Bond-Rainbow-Hajira-Joanette x Landhafer) Selection 1716, C. I. 7912, was named Houston and released to growers. This is a near spring type of short stature with good straw strength and rust tolerance. It is very tender so will have limited adaptation for fall seeding but may be used for spring seeding in a large area. Another strain, (Colo-Wintok-Hajira-Joanette) x (Atlantic-Clinton-Santa Fe) Selection 254-59-10, C. I. 8018, is being increased for distribution. This strain will be recommended for northwest Texas where it survived as well as Wintok in 1962 and 1963. At Bushland (Amarillo) this strain in irrigated tests yielded 144 bushels per acre from fall seeding and 106 bushels per acre from spring seeding. Yields of oats in performance trials were near record high this season with 143 at Bushland, 68 at Denton, 104 at McGregor and 100 bushels at College Station.

The backcross program to transfer stem rust resistance to Suregrain oats has been completed. The F_2 and F_3 populations from C. I. 7145 x Suregrain^5 were grown out, panicles selected and increased at Aberdeen, Idaho this summer. Four lines have been placed in replicated tests this fall and numerous other lines are in preliminary trials. Apparently genes for certain biotypes, especially 6AF, were obtained from Suregrain or from recombinations as some of these lines have greater stem rust than expected. It is hoped further increase and purification of these lines will soon give protection from stem rust to growers in South Texas.

Additional progress was made toward purification and stabilization of the cytoplasmic male sterile oats from the cross of Avena barbata x Avena byzantina5.

Earlier generation lines also are being tested in search of restoration factors. Another species cross has provided some interesting material for possible future use. A cross of Avena byzantina, var. Bronco x Avena steriles, var. Macrocarpa was made to transfer the very large anther from Macrocarpa to a cultivated oat. Anthers from an F_2 population of some 500 plants are being measured for size. Whether or not anther size will influence cross pollination possibilities is another question to be answered.

The multiple spikelet variation recently reported in Crop Science has been purified, increased and is being compared to the parent strain of normal spikelet number for yield and yield components.

A grant of $15,000 was awarded to Texas A&M University for further search and evaluation of the feral oats of Texas and Mexico. Some strains were found with very high resistance (no flecking) to races 276 and 294 of crown rust. Others have resistance to races 2, 6, 7, 7A, and 8 and 10A of stem rust. Whether or not these are different sources of disease resistance is not known but is being explored.

Diseases were not important factors in total production except for a small area in North Central Texas. Heavy infection just before maturity influenced yields and contributed to lodging of oats in late May in Denton, Sherman and surrounding counties.

Eight races of crown rust have been identified by Dr. Marr Simons from 1964 Texas collections. These are in order of prevalence races 326, 213, 327, 216, 264, 290, 202 and 295. Reference to older records show that there has been a major change in races since 1959-60. Race 216 was the most prevalent race in the 1959-60 season but has gradually decreased in prevalence. Races 326 and 327, which were not identified in the period 1959-61 appeared in 1962-63 but in 1963-64 these races made up 51% of the races isolated. Oat stem rust was not important this season owing to the very dry spring. Races 6F and 6AF comprised 67% of the isolates identified and the remaining 33% were races 5, 2, 7AF and 12A.

Halo blight was of some importance at Denton with 2 strains being seriously damaged. Severe leaf burn was caused by spraying oats at Denton with Toxaphene for control of army worms. Wide variety and strain differences were observed and apparent segregation for this reaction was evident among selections from a given cross. A report on reaction of many named varieties is being prepared. Crosses between resistant and susceptible lines are being made for further study.

Dr. M. C. Futrell is on a 2-year assignment in Nigeria. Dr. R. A. Kilpatrick, formerly in forage disease work at New Hampshire, has taken the work on cereal diseases. Clifford D. Hobbs has completed the Ph.D. degree and assigned to full time rust physiology work. Dr. Paul E. Pawlisch, who has been in charge of oats and barley research since 1959, resigned as of December 1, 1964 to accept a position with the Malting Barley Improvement Association at Milwaukee, Wisconsin.

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*** UTAH ***

by R. W. Woodward
ARS CRD USDA, Cooperating with
Utah State Experiment Station

Oat yield testing continues at Logan as in the past. All the varieties and strains in the regional nursery were free of disease, showed little lodging, and gave good yields. Markton, however, showed 80 per cent lodging.

Leading strains in 1964 were Bannock 161.7 bu., C.I. 7591 158.0 bu., C.I. 7572 155.8 bu., C.I. 7965 152.6 and Park 152.3. At the bottom were Clinton 59 129.0 bu., C.I. 7982 126.5 bu., and C.I. 7678 123.8 bu., per acre.

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*** WASHINGTON ***

Possible New Oat Varieties for Western Washington

by G. W. Bruehl, H. M. Austenson, P. C. Crandall and C. F. Konzak
Washington State University, Experiment Stations
Pullman, Washington

Yellow dwarf (red leaf of oats) is the major factor in reducing oat yields in Western Washington in most seasons. In 1959 an extensive screening of the World Oat Collection plus additional varieties from interested persons was begun. Of the over 4,000 varieties observed, three were selected in 1963 as worthy of further agronomic evaluation.

A Craig x Alamo line, designated 5271aB-2B-51, was among several received from Dr. Neal F. Jensen, Cornell University, in 1959. This oat is moderately tolerant to yellow dwarf and appears to have a very high yield potential. It is the highest yielder in 6 of 7 comparisons in Western Washington, 1962-1964, and in 5 of 5 in Eastern Washington in 1964. Practically no yellow dwarf was present in the Eastern Washington nurseries, illustrating possible adaptation to this area also.

Minnesota No. II-22-220 (C.I. 2874), also appears promising. It has greater yellow dwarf resistance than Craig x Alamo-51, but apparently has a slightly lower yield potential.

Kherson (C.I. 2871) is similar to Minnesota II in appearance, has the same high degree of tolerance to yellow dwarf, but the lowest yield potential of the three varieties and is more susceptible to lodging.

Craig x Alamo-51 and Minnesota II will be entered in the 1965 North Western Regional Oat Nursery and will be carefully evaluated in Washington.

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*** WISCONSIN ***

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

Wisconsin State Oat Yields and Variety Performance

The 1964 season was only fair for oat yields in Wisconsin. Near-drought conditions persisted in many areas, including Madison. Yields of oats in 1964 were better in the southwestern part of the state than in 1963. The state average yield of oats was estimated at 51 bushels per acre on September 1 by the State Crop Reporting Service. The state's acreage dropped to 2,076,000 giving a loss of 86,000 acres, or about 4 per cent.

Variety Performance

The Wisconsin Seed Certification Service again made available yield reports for varieties under certification. Table 1 presents these reports for variety averages, with number of growers for a given variety. The highest yield average was for Lodi with 57.9 bushels per acre for 103 growers. In descending order were Garry, Beedee, Garland, Goodfield, Rodney, Portage and Dodge. Ajax and Sauk were at the bottom. Also given are departures from similar reports of 1963. Goodfield had a .6 bushel higher average, while Sauk remained the same. All others decreased from 1.8 to 9.1 bushels per acre. These reports emphasize the belief that the 1964 season was less favorable for grain production than 1963. Rodney was certified in Wisconsin for the first time.

Table 1. Seed growers' reports of yields of oat varieties in Wisconsin in 1964 with departure from 1962

Variety	No. of growers	Yield in Bu/A.	Departure from 1963	Variety	No. of growers	Yield in Bu/A.	Departure from 1963
Ajax	11	43.7	- 6.9	Goodfield	9	52.8	+ .6
Beedee	85	54.2	- 5.6	Lodi	103	57.9	- 5.5
Dodge	16	47.9	- 6.5	Portage	17	49.7	- 1.8
Garland	91	53.9	- 9.1	Rodney	28	51.5	-
Garry	40	55.0	- 4.8	Sauk	10	43.5	.0

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(Wisconsin)

Rust Problems Continue

by H. L. Shands, R. A. Forsberg and D. C. Arny

The Wisconsin report in the XIV volume of the Oat Newsletter indicated that crown rust on volunteer oat plants in 1963 after the harvest season infected plants of varieties previously classified as resistant. Clintland 64 had moderate resistance. A special nursery of varieties and selections was planted in 1964 near buckthorn bushes for inoculum spread. Rust pustules were large and coverage was almost complete on a large portion of varieties and test selections including Lodi, Garland and similar derivatives. Of the named agronomic varieties Portage and Clintland 64 had much lower infection. A few test selections appeared intermediate to moderately resistant.

Crown rust was present in southern Wisconsin and probably reduced yields in a small proportion of fields. Stem rust was found on a number of occasions on varieties with AB genes conditioning stem rust response. This indicates that race 6AF was in many parts of Wisconsin. Damage to the crop was negligible.

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A selection of current interest is X643-75, C.I. 7978.

It is expected that Clintland 64 will be produced by growers for seed certification purposes in Wisconsin in 1965.

Personnel items: J. J. Pavek and D. C. Hess are in process of Ph.D. thesis completion on oats. D. M. Wesenberg is carrying on a thesis related to oat grain quality. D. W. Burrows, P. A. Salm and Paul Sun are graduate assistants in small grains.

Dr. I. Nishiyama, well-known Japanese oat cytogeneticist, will retire in March of 1965. He has received an appointment to join the Agronomy Department of the University of Wisconsin beginning in April 1965. It is hoped that the appointment will be extended for a second year.

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Distribution of Physiologic Races of Oat Stem Rust in the United States in 1964

(Preliminary report)

by D. M. Stewart and B. J. Roberts
(Cooperative Rust Laboratory)

Among 268 isolates of oat stem rust identified to February 1, race 6F comprised 62 percent; race 6AF, 30 percent; race 2 (with 5), 3 percent; 7A (with 7AF), 2 percent; and the remaining 3 percent included 6 other races and subraces (Table 1).

As in 1963, virulence for host gene F predominated. Approximately 93 percent of the isolates identified in 1964 had virulence for gene F; 34 percent had virulence for gene B; 31 percent had virulence for combined genes B and F; and 30 percent were virulent on combined genes ABDEF. Host gene B, although susceptible to 34 percent of the isolates, conditions resistance to the prevalent race 6F. Occurrence of virulence by states is given in Table 2.

Race 6AF comprised only 10 percent of the isolates in 1963 and was found in 5 states in the Mississippi valley. In 1964, 6AF was collected from 10 states and was the second most prevalent race (Table 1).

Races 7A, 7AF, and 12A were found 8 times in the states of Iowa, Missouri, South Dakota, and Texas.

Table 1. Distribution of oat stem rust races in the United States in 1964. (Preliminary.)

State	Race and times identified												Total isol.
	2	2F	4A	5	6A	6F	6AF	7	7A	7AF	12A	13A	
Arkansas						2	2						4
Georgia						1	1						2
Illinois						3							3
Iowa	1					57	22	1	2				83
Kansas						5	3						8
Kentucky						1							1
Minnesota						22	13						35
Missouri						22	8		1				31
Nebraska						5	4						9
New York			1	1								1	3
Oklahoma						2	1						3
Pennsylvania					1	1	1						3
S. Dakota						22	19		2	1			44
Texas	1			5		14	6			2	1		29
Virginia		1											1
Wisconsin						9							9
Total isol.	2	1	1	6	1	166	80	1	5	3	1	1	268
% isol.	1.0	0.3	0.3	2.2	0.3	62.0	30.0	0.3	2.0	1.0	0.3	0.3	100.0

Table 2. Occurrence of virulence for the B and F genes in the 1964 stem rust population. (Preliminary.)

State	Virulence for specific host gene(s)	State	Virulence for specific host gene(s)
Arkansas	F, BF	Nebraska	F, BF
Georgia	F, BF	New York	B
Illinois	F	Oklahoma	F, BF
Iowa	F, BF, B	Pennsylvania	F, BF, B
Kansas	F, BF	S. Dakota	F, BF, B
Kentucky	F	Texas	F, BF, B
Minnesota	F, BF	Virginia	F
Missouri	F, BF, B	Wisconsin	F

History of races 6 and 6F in the United States. Although race 6 was first described in Canada in 1927, it was not identified in the United States until 1950 when it was found to have spread directly from barberry to Sensation oats in New York. From 1950 to 1954, it was found only in barberry-infested areas of the northeastern states of Maine, New Hampshire, Vermont, New York and Pennsylvania, and once on barberry in Illinois in 1954 (Table 3). During the period 1955 to 1958, it gradually established itself outside of the northeastern area. It was found once in Missouri and Minnesota in 1955, once in Missouri again in 1956, twice in Texas and once in Wisconsin in 1957, and once each in 1958 in Iowa, New York, and Wisconsin. The collections from Texas in 1957 appeared to be significant at that time because oat stem rust is known to overwinter in Texas in certain years. Between 1958 and 1962, race 6 increased in prevalence from 1 percent to 69 percent and in geographical distribution from 3 states to 15.

In 1963 a striking change occurred, when race 6 decreased to only 2 percent of the isolates and the new 6F, first identified in 1961, increased to 70 percent. Thus far in 1964, race 6F has comprised 62 percent of the identifications.

Assuming that only minor changes in the genotypes for stem rust resistance occurred in the Mississippi Valley from 1958 to 1964, the recent varietal survey made by Roberts (1964) may partially explain the rapid increase in prevalence of race 6. As mentioned above, race 6 apparently became independent of barberry in 1955 and apparently persisted in the Mississippi "rust fly way" by overwintering on congenial cultivated and wild hosts in southern Texas. Approximately 1.8 million acres of oats planted in Texas in 1964 were susceptible to race 6. Also, in a triangular region extending southeastward from the northern border of Nebraska to Iowa, Illinois, and Indiana to Texas, approximately 7 million

Table 3. Record of race 6 and the closely related race 13 in the United States from 1950 to 1954.

Year	State	No. of uredial isolates identified	
		6	13
1950	New York	2	-
1951	Maine	1	-
	New York	-	1
1952	Maine	4	4
	New Hampshire	3	-
1953	Maine	1	-
	New York	3	-
1954	Illinois	1 1/	-
	Maine	2	-
	New Hampshire	2	-
	Pennsylvania	3	1

1/ On barberry

acres were planted to varieties susceptible to this race. Resistant varieties occupied only about 2 million acres.

The change in prevalence of races 6 and 6F in 1963 appears to have occurred suddenly and without a reasonable explanation. So far as is known today, there were no varieties planted commercially in 1963 which would have suppressed race 6 and favored the prevalence and distribution of 6F. Rust tests made at St. Paul have not detected host gene F in any variety that had been grown commercially, and gene F has not been detected in any line entered in the USDA oat yield performance nursery as of 1964. Thus, varieties and known sources of resistance are thought not to have been a factor in the sudden increase of 6F.

Data at the Cooperative Rust Laboratory suggest that 6F has been present for some time but just recently recognized. Certain isolates of race 6 and 6A that are now called 6F and 6AF were found in 1961 in the United States [1,2] and in Canada.[3] Cultures of rust identified as race 6 in 1958, 1959, and 1960

[1] Report of Cooperative Uniform Cereal Rust Observations Nurseries for the year 1961. No. 43, p. 12.

[2] 1961 Oat Newsletter, Vol. XII, p. 50.

[3] 1961 Oat Newsletter, Vol. XII, p. 66.

and put in vacuum dry storage in these years were re-identified in 1963 as pure cultures of 6F with the aid of Eagle^2 x CI 4023 (CI 8111). One isolate of 6 stored in 1957 also may have been a mixture of race 6 and 6F. A differential variety which adequately differentiates 6 from 6F was not included, with any consistency, in the race survey until 1963. CI 3039, 2413, and 2710 had been used on occasions during 1962, but sufficient seed was not available for the entire survey. The data thus far accumulated suggests that the race 6 which apparently came out of the Northeastern barberry areas may have been a mixture of 6 and 6F, and the presence and prevalence of 6F was not recognized until 1963 when additional differentials were added to the race survey.

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*** NEW OAT VARIETIES ***

a) Alphabetical List:

Name	C.I. No.	Origin
Barnes	--	McCurdy (Iowa)
Clintford	7463	Indiana (Purdue)
Elgin	--	McCurdy (Iowa)
Florida 500 1/	--	Florida
Goodcrest	--	McCurdy (Iowa)
Goodyield	--	McCurdy (Iowa)
Hannes	--	Finland (Tammisto)
Houston 2/	7912	Texas
Ora 1/	7976	Arkansas
Pennfield	7571	Pennsylvania
Santee	7454	Nebraska
Sorbo	--	Sweden (Svalof)
Stormont	--	Canada (Ontario)
Titus	--	Sweden (Svalof)
Tyler	7679	Indiana (Purdue)
Yale	--	McCurdy (Iowa)

1/ Winter Oat

2/ See page 55.

b) Description:

Barnes:

Barnes (McCurdy M626) was developed by W. O. McCurdy and Sons at Fremont, Iowa. It originated as an F_2 plant selection from a cross made in 1951 between (Columbia-Clinton-Landhafer) X (Santa Fe-Mo. 0-200). The Santa Fe and Landhafer varieties were obtained from Dr. H. C. Murphy and the Mo. 0-200 from Dr. J. M. Poehlman. The Columbia was from a commercial lot. The Clinton variety from Certified Seed from Iowa State University. The Columbia (single plant selection) X Clinton (single plant selection) was first crossed and then an F_2 plant from this was crossed to Landhafer (single plant selection). At the same time a cross between Mo. 0-200 (single plant selection) X Santa Fe (single plant selection) was made. Then in 1951 we made the final cross between Columbia-Clinton-Landhafer (single plant selection) F_2 plant X Mo. 0-200-Santa Fe (single plant selection) F_3 plant. The F_2 selection was made in 1953. Increased in 5 ft. row in 1954. Then in 1955 first increase was made and it has been tested since.

Barnes has given very good yield in Iowa and Minnesota for the past few years. It has shown in our trials to have very good crown rust tolerance when compared to varieties grown during this period. This variety has medium grey color of plump type with high test weight. It has better standing ability than Colfax or Mo. 0-205. Maturity is about the same as Clintland 60. It has fair tolerance to yellow dwarf, stem rust and crown rust that has prevailed in the field the past few years. It has a 78.2 bu/A yield to 65.8 bu/A for Cherokee for a three year average. It has about 2 lbs. per bushel test weight above Clintland 60.

Clintford:

Purdue 5328A3-4P-2, C.I. 7463 (proposed name: Clintford)

The new variety was developed at Purdue in cooperation with the U. S. Department of Agriculture. Its development marks the first utilization in the U.S.A. of straw strength derived from Milford, a superior Welsh variety. The variety was selected from the cross (Clinton 59)^2 Landhafer X Milford P.I. 193101.

The new variety is outstanding in Indiana in straw strength, yield, kernel size, test weight and percent groats. It is about 3 days earlier and 6 inches shorter than Clintland 60. The panicle is moderately compact but not as extreme as Milford. Panicle branches tend to angle upward. The grain is a light brownish white or a light yellowish white in some seasons.

The new variety is resistant to smuts and moderately susceptible to Septoria and yellow dwarf. It has resistance to crown rust of the "Bond" and "Landhafer" types and resistance to stem rust of the "DD" type.

About 250 bushels of breeder's seed were produced in 1964. Distribution to seedsmen in Indiana in the spring of 1966 is proposed.

Elgin:

Elgin (McCurdy M2611) was developed by workers of W. O. McCurdy and Sons, Fremont, Iowa. It originated from a F_2 plant selection from a cross of a single plant selection of Bond-Rainbow-Hajira-Joanette-Landhafer X Victoria-Hajira-Banner-Colo, made in 1956. The F_2 selection made in 1958 increased in 5 ft. row in 1959 and tested the first time in the following year, with increase carried out at the same time.

Elgin has a good yield record in Iowa and Minnesota. It has a 82.0 bu. - 4 year average at Fremont, Iowa which is about 15 bushel more than Cherokee and 5 bushel better than Clintland 60. It is about 1 lb. heavier in test weight than Cherokee and Clintland 60.

Elgin is a short plump kernel with heavy test weight, good yield, medium early in maturity.

Florida 500:

Florida 500 is being released and made available through the Florida Foundation Seed Producers Association in 1965. Approximately 500 bushels were distributed for planting in the fall of 1964. Florida 500 was derived from the cross Florad 5 x Fulgrain-3 x Suregrain 4 x Victorgrain^{2}2 x Fulghum 3 x Suregrain. It is short, medium early, resistant to prevalent races of crown rust including race 264, resistant to Victoria blight, moderately resistant to soil-borne mosaic virus, makes a semi-upright type of growth and produces high grain yields of good quality. It is comparable to Suregrain in hardiness and forage production but has outyielded Suregrain by about 7 bu./acre in grain yield trials over the past 3 years. Some variability in growth habit and glume color is present. (Quincy, Fla.)

Goodcrest:

Goodcrest (McCurdy M880) was developed by W. O. McCurdy and Sons. It is a single plant selection from the variety

Goldcrest described in Crop Science. (McCurdy and Koehler)[1]

Goodcrest has a good yield record in Iowa and southern and central Minnesota being slightly higher in yield than Goldcrest with more disease tolerance and better standing ability. On a 4-year average at Fremont, Iowa, Goodcrest outyielded Goldcrest by 4.5 bu. per acre.

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[1] McCurdy, LeRoy and Koehler, Carl. 1964 Registration of Colfax, Goldcrest Goldfield, Jewell, and Mahaska oats. Crop Science V4-236-237, 1964.

Goodyield:

Goodyield (McCurdy M1116) was developed at W. O. McCurdy ans Sons, Fremont, Iowa. It originated as an F_2 plant selection from a cross made in 1950 between Clinton-Santa Fe-Mo O-200 X Ajax. The F_4 plant was selected in 1955 and 5 ft. row in 1956 and increased and tested since.

Goodyield has given excellent yields in Iowa and Minnesota yield tests in the past few years. This is an early variety which gives fast growth and heads early but holds green as the oats ripen. It has medium size straw that is of the willow type, but stands good under most conditions. The oats are of a medium type with average test weight.

In our oat trials it has performed well with an average yield of 90.6 for Goodyield and 69.3 bu./acre for Cherokee for three year average. Slightly lower test weight than Cherokee.

Hannes: (a new Finnish oat variety)
by E. I. Kivi, The Plant Breeding Inst. of Hankkija Tammisto, Helsingin pit. Finland

In Finland oats make up about one-half of the area under cereals, and consequently this crop has a very important position in this country as a fodder grain. In 1964 Hankkija's plant breeding station released to the market a new oat variety, Hannes. It is intended for cultivation in the southern and central parts of the country, where Sisu oats, a very high-yielding variety but 5 days later than Hannes, has hitherto been widely cultivated. In Finland, where the harvest period is often rainy and cool, cereal harvesting by combine requires that the growing time of the crop is as short as possible. The cereal must also have a sturdy straw.

Hannes fulfills both of these requirements. Moreover, the husk content of its grain is very low (about 22%) and thus it is well-suited to the milling industry. The husk is light-coloured, as is that of all the commonly cultivated oat varieties in Finland.

Hannes is derived from the cross Sisu x Eho, and among its ancestors there is Swedish and also Canadian material in addition to Finnish. The line 091, selected from an eastern Finnish local strain, has played an important role in the oat breeding work carried out by Hankkija, since of the 14 varieties introduced to the market, there was only one which did not have this line among its ancestors. It is obvious that the genetical background of the material used in oat breeding must be greatly expanded, since as is seen from the ancestry of Hannes, current oat breeding work is being done on a very narrow genetical basis, and no radical improvements can be achieved in the future without a considerable enlargement in the basic breeding stock.

Ora:

Ora (Arkansas 3-74-543, C.I. 7976) was derived from a cross of (Lee x Victoria, 2 x Fulwin, 3 x Bonda, 4 x Landhafer) x Moregrain. It is a winter or fall-sown oat with hardiness approximating that of Arkwin. It is relatively short strawed, medium maturity, large grained and high in lodging resistance. It is equal to Moregrain in fall forage production. The grain yields of Ora have been high which has been partly due to its high winterhardiness and low temperatures during two recent years. Ora possesses satisfactory resistance to crown rust races 203, 216, 290 and 326 which are the current important races in the state. It is also resistant to Hel. blight.

Approximately 275 grams of seed of C.I. 7976 were sent to Aberdeen, Idaho for a summer increase in 1962. The increase seed was planted at Stuttgart in the fall of 1962 and 1963 spring yield was approximately 40 bushels of cleaned seed. The 40 bushels were used to plant 50 acres in the fall of 1963 and the spring yield was approximately 5,500 bushels (uncleaned) which was distributed as the source of foundation seed. (Thurman)

Pennfield:

Pennfield, C.I. 7571, is a selection from the following pedigree: Cleo x Improved Garry 5x Bonda 2x Hajira x Joanette 3x Sante Fe 4x Mo. 0-205. Pennfield has yielded in bushels 4.7, more than Garry, 14.5 more than Clintland 60 in three years of testing as an average of 62 observations. Pennfield as tested in Pennsylvania excels in straw strength, straw yield, high tolerance to B.Y.D.V., and is resistant to the following races of smut: A2, A7, A4, A9, and A11. Pennfield does not have high test weight per bushel. The need for a high-yielding strong strawed oat in the higher elevations in Pennsylvania is great and

Pennfield possesses these two traits in large measure. The actual advantage of the strong straw of Pennfield is not reflected in yield data since the yield plots were not combine harvested or fertilized for optimum yields for Pennfield.

Pennfield will be released by the Pennsylvania Agricultural Experiment Station and the release publication will be authored by Robert P. Pfeifer and Franklin A. Coffman, of the Pennsylvania State University and the Agricultural Research Service, of the U.S.D.A. respectively. Details of this variety and its development will be included in that report. (Pfeifer)

Santee:

'Santee' C.I. 7454 was developed at the Nebraska Agricultural Experiment Station in cooperation with the Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture. Santee originated from a cross in 1947 of Clinton x [(Victoria x Hajira - Banner) x Victory]. The male parent is also known as Rust Laboratory 1692.

Santee is a short, early, stiff strawed, high yielding spring oat variety. It heads about the same as Andrew and Neal but about a day later than Nemaha and Nehawka. The panicle is short and compact with numerous twisted awns on the primary kernel. The kernels of Santee are large, plump, and ivory colored. The kernels have a fair groat percentage normally about one percent below Andrew. The test weight is equal or slightly above that of Andrew.

Santee has some adult plant field resistance to crown rust. On the basis of Uniform Rust Nursery it has been assumed to have A*BD* genes for resistance to stem rust (* indicates heterogenous for genes A and D). It is resistant to races 7 and 8 of stem rust and heterogenous for resistance to races 7A and 8A. Santee is susceptible to race 13A of stem rust, barley yellow dwarf, and Septoria.

Santee was named and released for production in 1965. About 1000 bushels of foundation seed will be allocated to certified producers.

Sv original SÖRBO and Sv original TITUS oats:

Sv original Sörbo and Sv original Titus are both developed at the Swedish Seed Association, Sweden, and both are derived from a cross between Sun II and the selection Å 33079. Å 33079 originates from the cross Perle x Star and is early and fairly short. Sun II is middle late and one of the most commonly grown oat varieties in Sweden. The cross Sun II x Å 33079 was made in 1941 at the main station at Svalöv, but the selection work was done at one of the branch stations in the northern Sweden.

Sörbo is a white oats of the same type as Sun II but is distinguished from this variety by a little shorter straw and by the absence of hairs on the upper node. Although the short straw does not make Sörbo special sensitive to a dry climate under the early parts of the summer it seems to be best adapted to humid conditions.

Sörbo is very thoroughly tested during the last decade and compared to the three presently most grown varieties in Sweden the relative yield of Sörbo is as follows:

Relative yield of		Sörbo
Sun II	100	101.6
Blenda	100	104.1
Condor	100	100.8

The percentage pure kernel of Sörbo is similar to Sun II little less than for Blenda but higher than for Condor. Sörbo has a slightly higher 1000-grain weight than Sun II (34.0 and 33.4 grams respectively), while the test weight is somewhat lower than for the latter variety. Compared to Sun II Sörbo has 8 cm shorter straw. The straw stiffness is the same for both varieties. There is a tendency for earlier maturity for Sörbo compared to Sun II, but the difference is very small and less than one day.

Sörbo will be marketed in 1967 and seems to be best suited for cultivation in the southern and western parts of Sweden.

Titus is a white oats of a very early type and can in this respect be put in the same category as the earliest varieties of white oats.

The growth of Titus differs somewhat from other oat varieties. At the vegetative phase up to heading time the development is rather slow, giving possibilities to a heavy tillering under good conditions. The generative phase, however, and especially the ripening process goes very fast, probably depending on a lower heat requirement during this period than for other white oat varieties.

In the official Swedish trials Titus is mainly compared to Pendek and Blenda. On an average Titus has yielded 1.8% more than Pendek and 1.7% less than Blenda. In maturity Titus is about 3 days earlier than Pendek and 6 days earlier than Blenda.

Titus has rather small kernels (1000-grain weight = 31.0 grams), but a high test weight and a relatively high percentage pure kernels. The straw stiffness is very good and the resistance to straw breaking under later stages is relatively good. The good straw characters have made the variety of a special interest for growing on peat soils.

Titus will be marketed in 1967 and is intended for cultivation in the middle and northern parts of Sweden as well as at other places where an early maturity is wanted. There has also been an interest for growing the variety in both Norway and Finland. (Arne Wiberg)

Stormont:

O.A. 34-8 a spring oat variety was developed by the Ontario Project Group, Cereal Crops Section, from the cross 5243 (Shield x Garry-Klein) made at the Ottawa Research Station in 1952. Its main feature is its superior lodging resistance over current commercial varieties grown in Ontario. It has short stiff straw, satisfactory bushel weight, hull percentage, and seed weight. It matures about 3 days earlier than Garry. Resistance of Stormont to diseases is generally similar to Garry, being susceptible to the "A" and "F" races of stem rust and to several prevelent races of crown rust. Under normal conditions its yield is about equal to Rodney but less than Garry. Under conditions of high productivity and where lodging is likely to occur it has outyielded Garry and other check varieties. Its performance has been better in central and southwestern Ontario than in eastern Ontario during the past two seasons. (Zillinsky)

Tyler: Purdue 5414I3-8-1, C.I. 7679 (proposed name: Tyler)

The new variety was developed at Purdue University in cooperation with the U.S. Department of Agriculture. It was selected from the same parentage as Tippecanoe. They resulted from a cross of a Clintland 60 type oat with Mo. 0-205 followed by a backcross of an F_2 plant from this cross to a Clintland 60 type. The new variety is about 2 days earlier and 4 inches shorter in height than Clintland 60. It is similar to Tippecanoe and Goodfield in excellent straw strength. It is higher in yielding ability but somewhat lower in test weight than Tippecanoe and Goodfield. Kernel color is a light brownish white (or light yellow in some seasons).

It has resistance to stem rust from genes AABB and resistance to crown rust of "Bond" and "Landhafer" types.

Purdue 5414I3-8-1 is moderately susceptible to smuts and Septoria, and is susceptible to yellow dwarf.

About 250 bushels of breeder's seed were produced in 1964.

Distribution to seed growers in Indiana in the spring of 1966 is proposed.

<u>Yale</u>:

Yale (McCurdy M2674) was developed by workers at W. O. McCurdy and Sons, Fremont, Iowa. It originated from a F_2 plant selection from the cross (single plant selection) of Victoria-Hajira-Banner-Colo X (single plant selection) Ajax-Clinton. The cross was made in 1956 with F_2 selection made in 1958 and 5 ft. row in 1959 with testing and increasing starting the following year.

Yale has good yielding and test weight according to the yield test conducted in Iowa and Minnesota with a three year average yield of 85.6 bushels compared to Clintland 60 of 75.8 bu. per acre. It has a 35 pound test weight.

Yale has a medium type kernel.

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VI. C.I. NUMBERS ASSIGNED TO OATS IN 1964

a) *** USDA SMALL GRAIN COLLECTIONS ***

by J. C. Craddock
USDA, Beltsville, Maryland

The *Avena* collection inventory lists 8037 entries, 506 of these being new accessions received during 1964. Plant introduction (P.I.) numbers were assigned to the 405 entries from other countries by the New Crops Research Branch, CRD. Oat breeders in the United States submitted 101 varieties for C.I. numbers. Cereal investigation (C.I.) numbers 8062 through 8162 were assigned during 1964.

Additions to the list of "Abbreviation of Oat Varietal Names" are as follows:

C.I. No.	Variety	Abbreviation
7453	Garland	Gld
7509	Sumter	Str
7571	Pennfield	Pf
7624	Jefferson	Jf
7680	Tippecanoe	Tp
7690	Brave	Brv
7706	Sierra	Srr
7912	Houston	Ht

b) *** C.I. NUMBERS ASSIGNED TO OATS DURING 1964 ***

by J. C. Craddock
USDA, Beltsville, Maryland

CI Number	Name or Designation	Pedigree	Origin and/or Source
8062	PENIARTH	F_2 sel. from S.147 x 01747/10/7	Wales
8063	Ill. 61-1632	Albion x^2 Clintland 60	Illinois
8064	Ill. 61-8132	Alb 4x Cld 3x Gy 2x Hwk x Vtra $5x^2$ Gdf	"
8065	Purdue 558A1-22-1-1	Ctn 2x Boone x Cartier ^{2}3x LMHJA	Indiana
8066	Tex. 56C-2223	Fwn 2x Lee x Vtra 3x RR 4x Vtra x Rld 5x Bd x Rb 2x Hj x Jt 3x Ln	Nebraska
8067	Ill. 30896	Albion x^2 Clintland 60	Illinois
8068	Ill. 61-1613	" " "	"
8069	Ill. 61-3488	Ctn 3x Gy 2x Hwk x Vtra 4x Bur 5x P.I. 193027 x Sauk 6x Ctn 60	"
8070	Mass. A-1-2-57-2-60	Garry x Craig	Mass.
8071	Mass. A-3-2-57	Garry x Mo. 0-205	"
8072	Wisc. X1003-2	K.H.C. R48 (P.I. 174544) x Ctn $4x^2$ Ctn 3x Gy 2x Hwk x Vtra	Wisconsin
8073	NDO-64-14	Rxt x R.L. 1276 2x Ajax x R.L. 1276 5x Bda 2x Hj x Jt 3x SF 4x Mrn	N. Dakota
8074	Ill. 30959	Cherokee x Ark. 674 2x Fayette	Illinois
8075	Ill. 62-1532	Minrus x Morota Bond 2x Clintland 60	"
8076	Purdue 5817A3-2-4	Vtra 2x Hj x Bnr 3x Vtry x Hj 4x Rxt 5x Ctn ^{2}x Ark 674 8x Ctn 59 ^{7}x Lh ^{4}6x Ctn 2x Boone x Car 5x Vtra 2x Hj x Bnr 3x Vtry $_2$x Hj 4x Rxt 7x Cld 3x Ctn ^{2}x Ark 674 2x Mlf	Indiana
8077	WAHL #6	Selection from <u>A</u>. <u>sterilis</u>	Iowa
8078	WAHL #7	" " "	"
8079	WAHL #8	" " "	"
8080	WAHL #9	" " "	"
8081	---	" " "	"
8082	D-197	Selection from <u>A</u>. <u>barbata</u>	"
8083	D-203	" " "	"
8084	D-13	" " "	"
8085	D-55	" " "	"
8086	SILVA #17	" " "	"
8087	RUSS.-197	Selection from <u>A</u>. <u>strigosa</u>	"
8088	RUSS.-196	" " "	"

CI Number	Name or Designation	Pedigree	Origin and/or Source
8089	SAIA AUTOTETRA-PLOID	Same as Saia	Idaho
8090	---	Mutant of Ark. 674	Israel
8091	Can. R.L. 2792	Hj x Jt 2x LMHJA (CI 4023 x CI 7048)	Canada
8092	---	Hexaploid: A. strigosa^{II} x A. sativa	"
8093	Ark. 3-13-162	Lee x Vtra 2x Fwn 3x Bda 4x Lh 5x Mg	Arkansas
8094	Ark. 3-1-20	" " " "	"
8095	Ark. 3-74-74	" " " "	"
8096	461 G63	Abruzzes 2x Vtry x Reid 3x Magistral	Australia
8097	BLYTHE	Not available	"
8098	POLYSTACHLYA	" "	"
8099	833 Gu 63	Rld x WT 3x Vtra x Rld 2x Burke 4x Flg x WF	"
8100	485 G63	Vtra x Rld 2x Boppy 3x Belar	"
8101	W4587	Vtra x Rld 2x Burke 3x Flg x WF	"
8102	TONKA SEL.	Same as Tonka	Missouri
8103	Mo. 05355	Vtra 2x Hj x Bnr 3x Vtry 2x Hj x Ajax $4x^2$ Mo. 0-205	"
8104	Mo. 05356	Vtra 2x Hj x Bnr 3x Vtry 2x Hj x Ajax $4x^2$ Mo. 0-205	"
8105	Mo. 05357	Vtra 2x Hj x Bnr 3x Vtry 2x Hj x Ajax $4x^2$ Mo. 0-205	"
8106	Mo. 05458	Tka 5x Vtra 2x Hj x Bnr 3x Vtry 2x Hj x Ajax $4x^2$ Mo. 0-205	"
8107	Mo. 05359	Tka 5x Vtra 2x Hj x Bnr 3x Vtry 2x Hj x Ajax $4x^2$ Mo. 0-205	"
8108	Mo. 05360	Tka 5x Vtra 2x Hj x Bnr 3x Vtry 2x Hj x Ajax $4x^2$ Mo. 0-205	"
8109	Mo. 05361	Rdy 2x Lh x Fv 5x Vtra 2x Hj x Bnr 3x Vtry 2x Hj x Ajax $4x^2$ Mo. 0-205	"
8110	Mo. 05362	Rdy 2x Lh x Fv 5x Vtra 2x Hj x Bnr 3x Vtry 2x Hj x Ajax $4x^2$ Mo. 0-205	"
8111	Can. 2464	Eagle ^{2}2x Hajira X Joanette	Canada
8112	Can. 2443	Eagle ^{2}2x Hajira x Banner	"
8113	Va. 62-4-22	Victorgrain 48-93 x Cimarron	Virginia
8114	Mass. 13A-5-59-1-60	Dubois x Nysel	Mass.
8115	Mass. 13A-45-60	" "	"
8116	Mass. 13A-1-59-6-60	" "	"
8117	Ky. 63-8251	C.I. 4385 (RR type) x Fulwin	Kentucky
8118	Ky. 63-8616	Dubois x LeConte	"
8119	Ky. 60-834	" "	"

CI Number	Name or Designation	Pedigree	Origin and/or Source
8120	Ky. 60-852	LeConte ^{2}x Dubois	Kentucky
8121	Ky. 63-9206	" "	"
8122	Ky. 63-9233	" "	"
8123	Ky. 63-8851	Dubois x Wintok	"
8124	Ky. 63-8031	C.I. 4897 x Dubois	"
8125	Ky. 63-8086	" "	"
8126	Pa. 59ABC91-6	Cmr 4x Hj x Jt 3x Aln 2x Ctn ^{2}x SF	Pa.
8127	Pa. 60-4744	Advance x Nysel	"
8128	Pa. 61-1619-7	Milford x Wintok	"
8129	Pa. 59ABC138-14	Wintok Sel. x Hairy Culberson	"
8130	Pa. 60-4586	" " " "	"
8131	Pa. 59ABC118-1	" " " "	"
8132	Ky. 60-894	LeConte ^{2}x Dubois	Kentucky
8133	Coker 64-35	Fg-3 x Sg 4x Vg ^{2}2x Bd x Flg 3x Sg 5x Flr	S. Carolina
8134	Coker 64-39	Fg-3 x Sg 4x Vg ^{2}2x Bd x Flg 3x Sg 5x Flr	"
8135	Fla. 62-660	Arl 3x Wtk 2x Ctn ^{2}x SF 4x Flr	Florida
8136	Delta 3522	DR 88 6x Hj x Jt 4x Lee x Vtra 2x Fwn 3x Bd x Rb 5x Lh	Mississippi
8137	Delta 258-1RL	DR 88 2x Ctn ^{2}x SF 3x Dlr x Marvellous	"
8138	Delta 295-3	LMHJA 6x Hj x Jt 4x Lee x Vtra 2x Fwn 3x Bd x Rb 5x Lh 7x Vg 55111	"
8139	Delta 369-7	Delair x Milford	"
8140	Delta 1316-1	Lee x Anderson	"
8141	Delta 1316-2	" "	"
8142	Delta 6345-B	Dlr 4x Lee x Vtra 2x Fwn 3x Ctn ^{2}x SF 6x Hj x Jt 4x Lee x Vtra 2x Fwn 3x Bd x Rb 5x Lh	"
8143	Delta 62211-5	DR 88 6x Hj x Jt 4x Lee x Vtra 2x Fwn 3x Bd x Rb 5x Lh 7x NN x Lh	"
8144	Fla. 62-Ab-452	Flr 5x Fg-3 x Sg 4x Vg ^{2}2x Bd x Flg 3x Sg	Florida
8145	Fla. 62-Ab-666	Arl 3x Wtk 2x Ctn ^{2}x SF 4x Flr	"
8146	Tifton 6010	Sg x LMHJA 4x Arl x Dlr 2x Ts 3x Wg	Georgia
8147	Mo. 05180	Yugoslavia Sel. (P.I. 184002)	Missouri
8148	Mo. 05181	Yugoslavia Sel. (P.I. 184019)	"
8149	Mo. 05346	Yugoslavia Sel. (P.I. 184019) x Mo. 0-205	"
8150	Minn. 64-3114	Lh 3x Mdo 2x Hj x Jt 4x And 5x Ctn 6x Rdy 7x BM x Tetraploid	Minnesota
8151	NDO 64-17	Ajax x Ransom 2x Putnam 61	N. Dakota

CI Number	Name or Designation	Pedigree	Origin and/or Source
8152	Purdue 5842A4-14-3	Rxt x R.L. 1276 2x Ajax x R.L. 1276 3x Cld 2x P.I. 193027-2-1 6x Ctn 59 7x4 Lh 4x Ctn 2x Bne x Car 3x R.L. 2105 5x Cld 3x Ctn 2x Ark 674 2x Mlf	Indiana
8153	Purdue 5957RC4-5-3	Mlf 2x Ctn x Ark 674 3x Cld 60 2x Cld 3x Abda 4x Btn 5x Lh 2x R.L. 2105 3x Btn 7x Lh 5x Rxt x R.L. 1276 2x Ajax x R.L. 1276 3x Ctn x Bd 2x P.I. 174544-3 4x Ctn 59 7x Lh 2x Mlf	"
8154	Purdue 5965B1-7	Rxt x R.L. 1276 2x Ajax x R.L. 1276 3x Ctn x Bd 2x P.I. 174544-3 4x Mlf 2x Ctn 2x Ark 674 3x Cld 60 2x Cld 3x Abda	"
8155	Minn. 64-B456	Lh 3x Mdo 2x Hj x Jt 4x And 5x Ctn 6x Rdy 7x BM x Tetraploid	Minnesota
8156	Purdue 5652C2-13-1-3-1	P.I. 189754-4 3x Cld 60 2x Cld 3x Abda	Indiana
8157	Purdue 61106C1-6	Mlf 2x Ctn 2x Ark 674 3x Cld 60 2x Cld 3x Abda 4x P.I. 189754-4 2x Cld 3x Abda	"
8158	Tifton 6028	Sg x LMHJA 4x Arl x Dlr 2x Ts 3x Wg	Georgia
8159	ROSEN MUTANT	Not available	Canada
8160	R.L. 2793	Hajira x Joanette 2x LMHJA	"
8161	R.L. 2794	" " "	"
8162	R.L. 2795	" " "	"

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