Neal F Jensen

1957

OAT NEWSLETTER

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March 1, 1958

Sponsored by the National Oat Conference

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Vol. 8

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Neal F. Jensen, Editor

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I. CONFERENCE AND REGIONAL NOTES

Report from Chairman of National Oat Conference

The activities of the National Oat Conference this past year were devoted largely to arranging for the meeting which was held at Purdue University on January 29-31, 1958. About 90 persons attended the meeting representing all of the regions of the United States and all of the research disciplines involved in oat projects. The Purdue University facilities were excellent and the cordiality and hospitality of the host institution staff were wonderful. We all owe them a vote of thanks.

Mr. Coffman reported that the oat monograph preparation is progressing slowly. Two items of significance were discussed and acted upon during the business meeting: (1) a motion was adopted to report oat yields in the Uniform Nursery Report in pounds per acre, (2) the new chairman was instructed to appoint a committee to adopt a standard genetic symbolism for oats.

Dr. F. C. Elliott resigned as a Western area representative on the National Oat Conference Executive Committee and Dr. C. F. Konzak has taken his place. Dr. L. A. Tatum has also replaced Dr. H. A. Rodenhiser as one of the U.S.D.A. representatives.

Mr. W. H. Chapman was elected to be the new chairman of the National Oat Conference. Rumors have it that the next meeting may be in Florida.

Kenneth Frey, Ex-Chairman

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Secretary's Report - National Oat Conference

No meeting of the executive committee was held during 1957 and minutes of the three day (January 29-31, 1958) meeting at Lafayette, Indiana appear elsewhere in this publication. Sectional meetings of interest to the conference were held by the Northeastern Agronomists in New York City, January 6, 1958; a half day meeting of the North Central Oat Technical Committee was held on January 29 at Lafayette, Indiana and an impromptu meeting of (S. 13) Southern Agronomists was called by I. M. Atkins at Lafayette, Indiana on January 31, 1958. Reports of the activities of the different sections will appear elsewhere and need not be repeated here.

At the North Central meeting, one new member, Fred Patterson, was elected to the Executive Committee; hence, members of the Executive Committee as of February 1, 1958, are as follows:

Northeastern Region:	N. F. Jensen and Steve Lund
North Central Region:	E. G. Heyne, John Grafius, and Fred Patterson
Western Region:	Harland Stevens and C lvin Konzak*

*Appointed by chairman K. J. Frey to serve until an election can be held to fill the vacancy occurring when Fred Elliott left the Western Region.

Southern Region:	W. H. Chapman (Chairman) and I. M. Atkins
U.S.D.A.	
Cereal Branch Representative:	L. A. Tatum
Oat Section Representative:	H. C. Murphy
Editor of Oat Newsletter:	N. F. Jensen
Secretary:	Franklin A. Coffman

Election of New Chairman of Executive Committee

On request from K. J. Frey, chairman of the Executive Committee of the Oat Conference, on December 17, 1957, the secretary as has been the custom mailed to all committee members a request for nominations for chairman. Four members were nominated. On receipt of these nominations, a ballot was then prepared and mailed January 8, 1958 to all members to enable them to make their preference known. Among others, N. F. Jensen was nominated but he specifically requested that his name be withdrawn since he had already served one term as chairman.

Votes received from committee members on tabulation revealed that W. H. Chapman of Quincy, Florida, had received half of all votes cast and more votes than any other nominee; hence, was declared duly elected and so notified by telegram from the secretary.

In accordance with usual procedure, W. H. Chapman was, therefore, elected to serve as Chairman of the Executive Committee of the Oat Conference until the end of the next oat conference, which it now seems probable will be held in 1961.

Franklin A. Coffman
Secretary to Committee

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Minutes of the National Oat Conference
Memorial Union, Purdue University
Lafayette, Indiana
January 29-31, 1958

The first session of the Conference was called to order at 1:30 P.M. January 29 by the Conference Chairman, K. J. Frey.

Close to 100 were in attendance and apparently more states were represented than at any previous meeting of oat workers ever held in North America. Included among those present were one or more representatives from each of 27 States and Alaska; some 16 from different agencies of the U.S.D.A.; 3 from different experiment stations in Canada; 2 from the Quaker Oats Company; and 1 each from Poland (Rockefeller Foundation), and the Rust Prevention Association. Representatives were present from each of the 12 North Central States; 11 of the 13 Southern States; 3 of the 12 Northeastern States; but only 1 of all the 11 Western States. This representation probably reflects in general the interest of the different States and areas in oats. A list of those present who signed the register passed around at several of the different sessions is included with the secretary's minutes in his files.

The chairman traced briefly the pertinent facts incident to the origin of the National Oat Conference. He pointed out that the idea for a separate conference had first been considered in a night meeting of oat workers held during the annual meetings of the American Society of Agronomy at Hotel Lowry, St. Paul, Minnesota, November 11, 1954. As a result of the action taken at that meeting, which lasted until considerably after midnight, it was decided that in the best interests of those working with oats, a seperate oat work conference should be held and that no more attempts should be made to hold such a conference as an adjunct session of the annual meetings of the American Society of Agronomy.

The large number present at Lafayette and the wide representation of those in attendance was noted as evidence of the need for a separate oat conference.

The chairman read a letter received from T. R. Stanton, formerly in charge of the oat project in the U.S.D.A., expressing his regrets that because of the condition of his health he could not attend.

Dr. J. R. Shay, head of the Botany and Plant Pathology Department of Purdue University, was introduced to the Conference and spoke briefly, welcoming this, the first such oat conference to be held to the Purdue University campus and mentioning the marked progress that had been made in oat improvement in this country and in Indiana in particular.

The chairman called upon W. H. Chapman of Florida to stand, and introduced him to the Conference as the newly elected Conference Chairman who would take up his duties immediately after the close of the present Conference.

The chairman then called on each one present to stand and be introduced to the group and further requested that one representative from each of the different States, Canadian Provinces, and Alaska make a brief report on oat work, progress, and problems in his area. Each one present stood as called on and the work underway was discussed as follows:

S. S. Ivanoff mentioned the several diseases present and the light oat crop harvested as a result in Mississippi; W. H. Chapman and H. H. Luke mentioned the presence of crown rust race 264 and damage from H. avenae in Florida; T. T. Hebert, the unusually short oat crop due to dry weather in North Carolina; T. M. Starling, the increased attention now being given to winter oats and the decrease in spring oat work in Virginia; J. R. Shay, indicated that in 1957, 90.2 percent of the oat acreage in Indiana was devoted to varieties released within the last ten years and that 58.4 per cent was sown to varieties released within the last four years; J. H. Welsh reported that Septoria was prevalent in western Canada and crown rust in eastern Canada in 1957; V. C. Finkner stated that winter oat breeding work had been increased and spring oat work decreased in Kentucky; Dale Sechler indicated crown rust race 216, while present in Missouri in 1957, was not widely destructive, also that Dubois and Forkedeer have become leading winter oats in the State. H. L. Shands of Wisconsin noted that the oat acreage in that State had decreased by 300,000 acres in the last four years, and he mentioned that two infections of crown rust occurred in 1957. The first epidemic attacked Victoria derivatives, whereas the second attacked Landhafer derivatives. He mentioned that acreages of Beedee, Burnett, and Garry will likely be increased in Wisconsin in 1958. R. L. Thurman announced that H. R. Rosen, long connected with oat work in Arkansas, will retire June 30. He also mentioned the important shift in winter oats from use principally for grain production to their greater use as forage and hay. John Schmidt reported a 30 per-cent decrease in Nebraska's oat acreage and indicated that Mo. 0-205 is still the leading early oat in the State. Robert Pfeifer stated that drought had reduced 1957 oat yields in Pennsylvania and mentioned the increased interest in winter oats, also the need for stiffer straw as well as superior hardiness. R. L. Taylor reported briefly on oats and other matters of interest in Alaska. D. D. Harpstead mentioned the excellent yields of Garry, midseason, and Mo. 0-205, early oats in South Dakota in 1957. C. M. Brown stated that in 1957 crown rust in Illinois was the worst known, resulting in yields ranging from 0 to 100 bushels per acre. He also stated that 40 to 50 percent of the Illinois acreage was in Clinton and Clarion; that Minhafer was outstanding in performance; and that results indicate crown rust-resistant varieties will increase in acreage in 1958. He pointed out that winter oats are proving a promising crop in southern Illinois. Steve Lund of New Jersey indicated spring oats are decreasing in importance and that Dubois is the best winter oat for that State. In North Dakota, according to D. E. Ebeltoft, oat breeding work has consisted primarily in selection from among progeny of crosses made elsewhere. N. F. Jensen of New York reported that excellent yields were harvested in 1957 and mentioned the interest in winter oats in New York and some of the encouraging results being obtained from winter oat breeding work in progress. D. D. Ray pointed out that dry weather had cut oat yields in southern Ohio and excessively wet weather had affected yields in the western and northern parts of the State in 1957. He mentioned the damage from first, "Victoria", and then later from "Landhafer" races of crown rust, stating 90 per cent of the State acreage had been sown to Clinton. He mentioned also Dubois as being their best winter oat now recommended in the southern part of the State. John Grafius stated that Canadian oats were best adapted to northern, whereas Corn Belt varieties were better in southern Michigan. W. P. Byrd of South Carolina indicated that oat losses were severe in 1957 and that only about half the acreage was harvested for grain because of severe damage from virus, crown rust, and the new yellow leaf trouble. He mentioned Trispernia as giving desired resistance to those crown rust races present in 1957. N. I. Hancock reported that winter oats are on the increase in Tennessee primarily because of the dairy interests and that now spring oats are seeded in that State usually only when winter oats cannot be sown. *Helminthosporium* was reported as damaging in Tennessee in 1957.

I. M. Atkins stated that in Texas about one million acres sown primarily for pasturage are usually not included in the U.S.D.A. reported oat acreage figures. He pointed out that, whereas *H. victoriae* susceptible varieties such as Mustang had previously been grown without much trouble in Texas, in 1957 a 14 per cent loss resulted from *H. victoriae* and an 11 per cent loss from crown rust. He stated further that culm rot was also unusually destructive.

Oats for forage purposes are increasing in importance in Georgia, according to U. R. Gore. About a million acres are now grown in that State, and he pointed out that derivatives of Santa Fe, Landhafer, and Hajira-Joanette are usually very highly susceptible to soil-borne virus. He mentioned the damage resulting from the yellow leaf trouble and from crown rust races 216 and 213 in 1957. He indicated also that by seed treatment, losses from H. victoriae had been held down in Georgia. Harland Stevens from Idaho stated that Park had now been distributed throughout the Northwest, but that some concern is felt due to is complete susceptibility to H. victoriae. He mentioned the probable release of C.I. 5345, a resistant sister strain to Park. W. M. Myers reported that both early and midseason oats yielded almost equally well in Minnesota in 1957 and that, whereas Minhafer was becoming a well-known oat elsewhere, it had not as yet become as popular in Minnesota as it had in areas farther south. He mentioned the results from use of "LMHJA" strains in crosses with Andrew and Clinton. E. G. Heyne indicated oats were on the increase in Kansas and, due to the cool moist season, yields were good in 1957. He mentioned that Minhafer was superior as to straw in Kansas in 1957. Fred Patterson discussed the presence of rust in Indiana in 1957. He mentioned the new oat, Clintland 60, and stated that, whereas Dubois showed considerable rust injury this year for the first time, seed of a Dubois x Clintland[7] strain was now available. According to Byrd Curtis, too much rain resulted in high yields, much lodging, and low test weights in Oklahoma in 1957. The presence of crown rust race 216 was mentioned and he stated that 85 percent of Oklahoma's oat crop now results from fall seeding and the remaining 15 percent from spring seeding. K. J. Frey reported that crown rust race 216 damaged some Iowa oats in 1957 but indicated that, whereas race 290, to which Landhafer derivatives are susceptible, was present on volunteer oats late in the season, it came on too late to be really serious. He also mentioned the large acreage of Clintland in Iowa in 1957.

This completed the roll call and presentation of State reports. A short intermission followed, after which the Conference resumed. As the previous report of the secretary and minutes of the last meeting had already appeared in the Oat Newsletter, reading of these was dispensed with.

Neal F. Jensen spoke briefly on the matter of the Newsletter for 1957, and mention was made of the desirability of all material being received by the editor promptly in accordance with his communication of January 21, 1958. Jensen then spoke of the reasons for the desirability of dispensing hereafter with the word "National" in the title of the annual publication. After some discussion, it was moved by Neal F. Jensen and seconded by Frank Petr that the word "National" hereafter be omitted from the title of the (National) Oat Newsletter. The motion was put and passed without a dissenting vote.

The chairman spoke on the status of the Oat Conference and stated that, whereas the reaction to the plan was at first not universally favorable, objections had not been too widespread nor too serious and the Conference had been called. He indicated that the attendance denoted acceptance of the idea.

A report from the editor of the Oat Monograph, Coffman, was requested. The report appears on page 8.

W. M. Myers, speaking in his capacity as President of the American Society of Agronomy, mentioned the scope of the work required in preparing and publishing a book such as the Oat Monograph. He urged that chapters due be completed without further delay so that they could be adequately reviewed and transmitted to the editorial staff of the Society in short order. He pointed out that the staff had already made the necessary arrangements in their work schedules for giving attention to this publication.

The matter of future designation of the "Oat Man of The Year" was brought up by the chairman for discussion and possible decision of the Conference. After remarks by H. L. Shands, John Grafius, and others, it was moved by A. M. Schlehuber and seconded by John Grafius that the entire matter be tabled. The motion was passed.

The chairman brought up the matter of preparing and making available in suitable form descriptions of oat varieties. Verne Finkner pointed out the lack of homozygosity in certain varieties and hence the difficulty in describing them accurately. F. A. Coffman spoke of the general and decided lack of homozygosity in morphological characters of many newly named oats, as revealed by classification studies. He also mentioned the almost appalling lack of information as to either the origin or the history of many oats now being offered by cooperators as entries in regional nursery experiments, stating that this dearth of information was resulting in a decided deterioration in the value of the C.I. collection file. H. C. Murphy discussed the matter of compiling descriptions of the disease resistance of new oats and the difficulties connected with such an undertaking.

The matter of the use of the Oat Newsletter as a source of information on new varieties was mentioned, and the question was raised as to whether the publication should be made available and, if so, to whom. Although considerable discussion followed on each of these matters brought to the attention of the Conference by the chairman, no action was taken on any of them.

The chairman called for a statement by H. C. Murphy on the matter of use of the decimal in reporting oat yields. Murphy reported that, whereas most stations reported yields to one decimal, others did not. Finkner stated that the use of pounds per acre in reporting yields was being suggested by the American Society of Agronomy. Hancock stated pounds per acre was the method used in calculating yields in Tennessee. Heyne suggested that we make a start by hereafter reporting oat yields in pounds. Poehlman reported he now converted his acre yields in pounds to bushels per acre only for purposes of reporting yields for use in the annual oat data compilation. Stevens reported that legal bushel weights, especilly in some Northwestern States, varied from State to State, being greater than 32 pounds in some States. He stated that it was customary in that area to report yields of all cereals in pounds per acre, as yields in bushels had different meanings in different States. Dallas Western reported that in grain trade channels, the bushel still was the unit and indications were it would remain so for some time.

It was moved by Schlehuber and seconded by Heyne that hereafter yield of oats in hundred weights per acre be used in compilations. An amendment to that motion was offered by Coffman to the effect that yields be reported in total pounds per acre, not hundred weights. This was seconded by Poehlman. On vote, the amendment to the motion was carried -- 20 in favor and no dissenting votes.

The motion as amended then read: "Moved that hereafter oat yields to be included in future oat nursery compilations should be expressed in pounds of grain per acre rather than in bushels per acre as had previously been done." On vote, the motion was passed, 16 for, 2 opposed.

The chairman then brought up for discussion and possible consideration the matter of appointing a committee on genetic nomenclature in oats. Heyne reported the situation with regard to barley. After some discussion by several of those present, it was moved by W. M. Myers and seconded by Dick Caldecott that a committee be appointed by the chairman to explore the matter of standardization of genetic nomenclature in oats. The motion was passed, and the chairman announced the committee will be appointed by the incoming chairman.

Following this business meeting, reports on uniform nurseries were called for by the chairman. Murphy reported very briefly on results from the uniform nursery in the North Central Region; Coffman made a few statements as to results from the yield nurseries in each -- the Northeast, the Spring-Sown Red Oat Region, the Northern Winter, Central Area Winter, Southern Winter, and on the Uniform Hardiness Nursery. Stevens made a few brief comments on results from the Western States irrigated and non-irrigated nurseries. Processed preliminary reports of some of the final 1957 results from each of these nurseries were passed out by Murphy, Coffman, and Stevens to those interested.

The meeting adjourned about 5:30 p.m.

The next five sessions of the Conference followed closely the previously prepared program appearing elsewhere in this publication.

The Conference banquet was held at 6:45 P.M., January 30 with some 80 in attendance. Following the banquet, a few remarks were made by the Conference chairman, K. J. Frey, tracing the history of the conference to date. He then introduced the ladies present, Mrs. Caldwell and Mrs. Shay; J. B. Peterson and J. R. Shay, the heads of the Agronomy and Plant Pathology Departments of Purdue University, respectively, each of whom spoke briefly; the chairman of the North Central Oat Technical Committee, E. G. Heyne; and officers of the Executive Committee of the Oat Conference. The chairman then introduced R. M. Caldwell of Purdue University who in turn introduced Dean Earl L. Butts, Purdue School of Agriculture, who gave the address of the evening, much enjoyed and appreciated by those in attendance.

Following the banquet, Eugene B. Hayden of the Rust Prevention Association showed a film prepared under the auspices of that organization which portrayed the endless struggle of man against the ravages of cereal rusts.

The program outlined for the Conference was completed at about 5:15 p.m. January 31. Just prior to adjournment, N. F. Jensen presiding, the chair recognized J. A. Browning of Iowa who read the following resolutions and moved their adoption: "Resolved that the secretary of the National Oat Conference be instructed to convey to Dean Butts and Doctors Shay, Peterson, Caldwell, Patterson, Schafer, Compton, and others of the Purdue University staff the thanks and appreciation of the Conference for their hospitality during this meeting of the National Oat

Conference and to state that those of us who have been to Purdue before are always happy to return and that newcomers find it a pleasant experience; that the tremendously adequate physical facilities which Purdue offers for such a meeting and the warm welcome of the local workers have contributed greatly to the enthusiasm and esprit de corps shown by the oat workers at this Conference." The motion was duly seconded and passed unanimously.

Following the passage of this motion, the 1957 Oat Conference was declared adjourned by the chair. Shortly thereafter, many, accepting the invitation of R. M. Caldwell and associates, left for a tour of inspection of Purdue's new Plant Science Building, greenhouses, and other facilities for conducting crop research.

Franklin A. Coffman, Secretary

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Report on Oat Monograph

The Oat Monograph as now outlined is to include fifteen chapters. As of February 10, 1958:

Four chapters have been completed, reviewed, and mailed to the Editorial office of the American Society of Agronomy.

Six chapters are now with the Monograph Editor. These differ in stage of completeness. Some will require a few hours to complete, others a week or more of work before they will be in final form.

Two chapters are said to be in near final form but have not as yet been received.

Three chapters are in draft form or are as yet incomplete.

The editor expects to devote much of his time during the next two months to the Monograph. It is hoped that all chapters will have cleared his office prior to the start of field work. A recent letter from W. M. Myers, President of The American Society of Agronomy, indicates his desire that all chapters be received by the Society Editorial staff by March 15, 1958.

Franklin A. Coffman
Editor of Oat Monograph

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Proposal for Winter Oat Hybrid Seed Distribution

At an informal meeting at Lafayette attended by a number of those interested in winter oats, it was the opinion of the group that to expedite further winter oat improvement it would be helpful if a center for information were established, the purposes of which would be:

(1) To receive and compile a list of winter oat hybrids of which seed was available for distribution: listing where and from whom such was obtainable, together with information as to pedigree, generation, and amounts.

(2) To supply interested workers with copies of the information enabling them to write direct to the prospective sources for obtaining whatever might be available for use in their own oat breeding programs.

It was the group's opinion that the list should be compiled and made available by F. A. Coffman, Oat Section, Plant Industry Station, Beltsville, Maryland who has agreed to accept this responsibility.

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II. PROCEEDINGS OF THE NATIONAL OAT CONFERENCE

Purdue University, January 29-31, 1958

Wednesday P.M. (January 29) 1:30 -- Presiding, K. J. Frey

1. Business meeting
   (a) Introductions
   (b) Report of the Secretary
   (c) National Oat Newsletter report
   (d) Status of National Oat Conference
   (e) Monograph
   (f) Oat Man-of-the Year
   (g) Technical Committee reports
   (h) Publication of variety descriptions
   (i) New officers
   (j) Old and new business
2. State reports - (5 to 10 minutes each)
3. Reports on Uniform Nurseries - Results and purposes - H. C. Murphy, F. A. Coffman, and H. Stevens

Wednesday Evening - 8:00 -- Presiding, H. C. Murphy

1. Winter oat breeding - (25 min.) - N. F. Jensen and E. J. Kinbacher
2. Studies on cold hardiness in oats - (15 min.) - R. P. Pfeifer
3. Effect of freezing on pre-emerged oat seedlings - (15 min.) - E. J. Kinbacher
4. Nursery seeder and bird chaser - (10 min.) - R. P. Pfeifer
5. Laboratory equipment - (10 min.) - A. L. Thurman
6. Nursery seeder - J. W. Schmidt - (5 min.)
7. Oat dehulling equipment - (10 min.) - K. J. Frey

Thursday A.M. (January 30) 8:30 -- Presiding, A. T. Wallace

1. Relative importance of various oat diseases in the U.S. over a 30-year period (20 min.) - H. C. Murphy
2. Recent occurrence of races of crown rust attacking Landhafer in the U.S. (10 min.) - M. D. Simons
3. Physiologic races of crown rust of oats in Canada - (15 min.) - B. Peturson
4. Tolerance to full crown rust infection - (10 min.) - R. M. Caldwell, etc.
5. Variable rust reactions of radiated Floriland to Landhafer races of crown rust (15 min.) - H. H. Luke, etc.
6. Crown rust losses in 1957 and protection by Landhafer resistance in Indiana (10 min.) - J. F. Schafer, etc.
7. Effects of rust on yield of certain varieties - (5 min.) - D. C. Arny
8. Oat stem rust survey in 1957 - (5 min.) - B. J. Roberts
9. Reaction of World Collection of oat species to oat stem rust races, 5-US-1, 6, 7, 8. - (5 min.) - B. J. Roberts

Recess (10 min.)

10. Discussion of topics relating to rust of oats - H. C. Murphy, M. D. Simons, B. J. Roberts, J. Schafer, etc.
    (a) Rust testing facilities - Puerto Rico facilities, the possibilities of a central rust testing center.
    (b) New rust races and how to keep ahead of them -- Rust sampling methods, sources of resistance, new methods of testing for susceptibility.
    (c) Rust genetics and physiology

Thursday P.M. - 1:30 -- Presiding, M. D. Simons

1. Wild oats of Texas - I. M. Atkins - (10 min.)
2. Vector specificity among strains of barley yellow dwarf virus - (20 min.) - W. F. Rochow
3. Further studies on the yellow dwarf disease of cereals - (15 min.) - R. M. Endo
4. A non-parasitic leaf spot of oats - (10 min.) - A. L. Hooker
5. Varietal reactions to a yellowing condition of oats in South Carolina in 1957 (15 min.) - W. P. Byrd and R. W. Earhart
6. Problems in breeding for resistance to <u>Septoria avenae</u> - (20 min.) - A. L. Hooker

Recess (10 min.)

7. Seed treatment of oats - (5 min.) - E. D. Hansing
8. Spikelet drop in oats - T. T. Hebert - (15 min.)
9. Yield losses from blasting in the 1957 Iowa oat crop - J. A. Browning and K. J. Frey - (15 min.)
10. Screening the World Collection of oats for resistance to greenbugs, <u>Toxoptera graminum</u> - (20 min.) - H. Chada
11. Policy for naming varieties derived by backcrossing and maintaining breeders' seed - R. M. Caldwell and D. Ray - Discussion - (40 min.)

Thursday Evening - 6:30 -- National Oat Conference Banquet: Speaker - Dr. Butts, Dean Purdue School of Agriculture

Friday A.M. (January 31) 8:30 -- Presiding, R. M. Caldwell

1. Results of current oat investigations at Winnipeg - (20 min.) - J. N. Welsh
2. Procedure for Selection for Yield - (15 min.) - J. E. Grafius
3. Problems associated with the use of ionizing radiation in oat improvement (25 min.) - R. S. Caldecott
4. Progress report on the production of monosomics in cultivated oats - (10 min.) K. Sadanaga
5. Influence of ploidy on biological effects produced by ionizing radiation in oats - (10 min.) - F. Koo and W. M. Myers
6. Temperature effects on meiosis in a heterozygous translocation progeny of Avena strigosa - (10 min.) - F. Koo and M. Tabata
7. The present status of genetic studies of rust resistance in oats in Minnesota (10 min.) - W. M. Myers and F. Koo

Recess (10 min.)

8. Discussion of release policy, division of work by states, certification problems. R. Pfeifer, D. Harpstead, A. M. Schlehuber, etc.

Friday P.M. - 1:30 -- Presiding, N. F. Jensen

1. Lodging resistance in oats - (25 min.) - K. J. Frey
2. Lodging of small grains and its pattern as concerned with oats - (10 min.) - N. I. Hancock
3. Some problems concerned with the improvement of the mechanical strength of oat straw - (20 min.) - O. T. Bonnett
4. Tillering capacity and seed weights of six oat varieties - F. C. Petr - (5 min.)
5. Discussion of oat quality criteria - (40 min.) - F. C. Petr, A. M. Schlehuber

Recess (10 min.)

6. Effect of Nitrogen, rate and date of planting, and variety on yield and quality of oat silage - (15 min.) - J. W. Pendleton
7. Rate of seeding and variety of oats in relation to grain and forage yields (15 min.) - F. L. Patterson, et al.
8. The fermentation characteristics of oat silages harvested at the boot, milk, and dough stages - (10 min.) - D. L. Hill and C. H. Noller
9. The comparative feeding value for milking cows of oat silages harvested at the boot, milk, and dough stages - (10 min.) - C. H. Noller, et al.
10. Plans and procedures for evaluating oats for hay - (10 min.) - B. C. Curtis and A. M. Schlehuber
11. Discussion of silage production from oats - L. L. Patterson, F. P. Gardner

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Abstracts of Papers Presented

Winter Oat Breeding
by N.F. Jensen and E.J. Kinbacher

Perhaps 1000 of the 700,000 acres annually planted to oats in New York is winter oats. The interest and research of the Cornell Agr. Exper. Sta. and the U.S.D.A. is thus premised on the potential productivity, rather than the actual productivity, of winter oats for the Northeast. The climate and geography of this area has unique advantages for the realization of maximum yields of winter oats, provided a further step advance in winter hardiness can be achieved. Research is primarily directed at this latter objective.

Drawing upon analogous experience with other winter and spring varieties in New York, it has been found that winter wheat is about twice as productive as spring wheat and that winter barley is about one and one-half as productive as spring barley. The climate of the area thus favors the fall-sown crop. Winter oats would be expected to outyield spring oats on the average, because they will escape more of the hazards of production, such as heat, drouth and damage from diseases. To accomplish this situation breeding for earlier winter oats is also an important objective.

Greater production of oats - whether spring or winter - is needed in New York. This area is frequently deficient in livestock and poultry feeds of this kind and any addition to the supply of home grown grains is desirable.

Breeding for winter hardiness involves the acceptance of the concept that winter hardiness is not a single characteristic but rather a complex, of which cold resistance is but one part. Winter hardiness may be defined as the result, usually expressed as survival, of the interaction of various stresses upon the plant during the fall, winter and spring seasons. This interaction and the relative part the individual components play have different values under different environmental conditions. Winter hardiness has different meanings, for example, in Florida, Texas, New York, or Manitoba, Canada.

If the assumption that winter hardiness is a complex character is correct, then this creates a favorable situation for the plant breeder. Instead of the limited recombination possibilities inherent in situations involving single or few allelic pairs, there exists in all likelihood some multiple of the number of characters playing a part in winter hardiness. Some inferences which may be drawn from a situation of this kind are:

1. Step-wise progress towards increased hardiness, i.e., a long term project in which it would be difficult at this time to predict the ultimate obtainable level of hardiness;

2. An interaction of research location with the type and degree of winter-hardiness obtained (this means that at different locations, widely separated, separate breeding programs may need to be maintained);

3. Opportunities to combine different types of winterhardiness, e.g., crosses between hardy lines developed under different conditions may produce segregants of greater hardiness than the parents.

The speakers concluded by citing several apparently promising breeding approaches to the objective of increased winter hardiness. Included were references to testing under extreme stress conditions, breeding for components of winter hardiness, the use of hardy x hardy parents, the use of spring -- especially early spring varieties -- in crosses with hardy types, the possible value as parents of the so-called "universal" type of oat varieties (e.g., Ajax, Mo. 0-205), and the development of "Multiline" varieties.

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Studies of Cold Hardiness in Oats

Robert P. Pfeifer, Pennsylvania State University

Mr. Phillip Kline completed the following study and found:

1. Seeds germinated in Petri dishes were damaged by freezing not in relation to their winterhardiness. The variety LeConte was the most resistant to freezing of the varieties tested.

2. Freezing chamber tests of seedlings grown in soil were closely related to varietal winter hardiness found by field observations. These findings are similar to those of Dr. M. C. Amirshahi and Dr. F. L. Patterson.

3. Of the several varieties of winter oats grown in flats in the field, it was found that

   a. October 2 planting predisposed all varieties to winter kill.

   b. September 10 and 21 plantings had about the same amount of winter kill, but leaf injury was greatest on the early planted material.

   c. Severe kill was observed during the months of February and March.

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A Nursery Planter for Small Grain

R. P. Pfeifer, Pennsylvania State University

A nursery planter for small grains was built and used that has the following features: Tractor drawn and power lifted by a 3 point hitch; plants 4 rows from 1 packet of seed; plants rates accurately; self cleaning belt type feed; continuous type feed so that the planter is not stopped between plots; Universal mounts for all types of John Deere, Van Brunt, drill openers; "0" pressure International rubber tire press wheels used; a slow rate of planting is 100 four-row plots 10 ft. long with 3 ft. alleys per hour. The planter is small enough to be carried inside 1/2 ton carryall or in a 1/2 ton pick-up truck.

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Laboratory Equipment
by R. L. Thurman

A report of the present status of oat production and research work in Arkansas was presented at the National Oat Conference.

A short paper on a seed packaging machine, single head-row and portable seeders was presented. Mimeograph material on the seeding equipment has been mailed to some of the breeders and others may secure it on request.

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Oat Disease Losses in Iowa for the Period 1926-57, Inclusive, and Problems Involved in Breeding for Disease Resistance

H. C. Murphy and J. A. Browning

The development and distribution of rust-, and smut- and Helminthosporium resistant oat varieties during the past quarter century represent an outstanding contribution to American agriculture. Comparative yield data indicate the state of Iowa gained an extra average annual oat crop during the ten-year period, 1941-50, as a result of growing new disease resistant varieties. About 98, 90 and 75 percent of the oat acreages of Iowa, the Corn Belt and the United States, respectively, were first changed over to Victoria derivatives during 1941-45, and then to Bond derivatives during 1946-50. These striking change overs in oat varieties resulted in a marked increase in overall yield and production although there were some heavy losses resulting from the build up of specific diseases and races.

The two very rapid and nearly complete change-overs from susceptible to resistant varieties had a striking effect on the prevalence and severity of certain diseases and races. *Helminthosporium victoriae* was discovered in 1944. By 1946 and 1947 it had become a limiting factor for profitable oat production with Victoria derivatives in most of the United States. Races 8 and 10 of stem rust also showed a striking increase in prevalence and severity along with the increase in acreage of the susceptible Victoria derivatives. Bond and its derivatives were resistant to 98 percent of all crown rust collections in the United States previous to 1944, but by 1950 the Bond derivatives were susceptible to 98 percent of all collections. Most of the Bond derivatives were susceptible also to race 7 of stem rust which became much more prevalent and destructive, starting in 1950.

The relationship between the increase in acreage of the susceptible Victoria derivatives and the prevalence and severity of races 8 and 10 of stem rust and of H. victoriae are very striking. Likewise, there was a striking relationship between the increase in acreage of the susceptible Bond derivatives and the increase in prevalence and severity of the Bond-attacking races of crown rust and of race 7 of stem rust.

The estimated annual total losses from all oat diseases in Iowa have ranged from 0.2 percent in 1930 to 51.6 percent in 1955, with an overall average of 21.4 percent for 1926-1957, inclusive. Minimum losses have been experienced during drought years. Crown rust has been the most important disease in Iowa, causing an average estimated annual loss of 7.2 percent for the past 32 years. The average estimated loss from stem rust for the same period was 1.6 percent. H. victoriae caused estimated losses of 25 and 32 percent in 1946 and 1947, respectively, but was completely controlled, starting in 1949, by growing resistant varieties. Losses from oat smut which had averaged an estimated 4.5 percent from 1926-1943, inclusive, have been effectively and completely controlled since 1942 by the development and growing of resistant varieties. Septoria and yellow dwarf have each caused estimated maximum losses of 15 percent to the Iowa oat crop although they usually are of minor importance compared with crown and stem rust. Losses from root diseases have probably been heavy but accurate estimates are difficult to make. H. avenae, halo blight, non-parasitic leaf spot, blast, scab and blue dwarf have occasionally caused appreciable losses to the Iowa oat crop but are considered to be relatively minor in importance.

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Recent Occurrence in the United States of Races of Crown Rust Attacking Landhafer

M. D. Simons

Several races of crown rust having in common the ability to parasitize Landhafer were identified from material collected in the United States in 1957. These races conveniently fall into two groups. The first group, designated as the 264 group, consists of three very closely related races (264, 276, and 263), to which Landhafer is moderately susceptible. These races were identified from material collected in America several years ago, and were common at Quincy, Florida, early in 1957. They appeared in very small trace amounts in several other widely scattered states later in the year. The races in this group are very similar, and show little evidence of comprising different subraces or biotypes. All of the races of the second group, designated as the 290 group were described for the first time in 1957. At this writing the 290 group consists of four races (290, 293, 294, and 295). Races of the 290 group were common in one small area near Gainesville, Florida, early in 1957, and later appeared in the eastern half of the cornbelt with sufficient frequency to be readily detected. They occurred less frequently in certain other widely scattered states. These races comprise a wide variety of subraces and biotypes, all of which are highly virulent on Landhafer. Certain sources of field resistance to the 264 group also appeared to be resistant to one culture of a race of the 290 group.

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Physiologic Races of Crown Rust in Canada

Plant Pathology Section,
Canada Department of Agriculture Research Laboratory
Winnipeg, Manitoba

by B. Peturson

Annual surveys have been made since 1929 to determine the identity, prevalence and distribution of the physiologic races of crown rust (Puccinia coronata Corda var. avenae Erikss.) that occur in Canada.

Fifty races and sub-races of crown rust of oats have been identified. Prior to 1945, nearly all the isolates obtained belonged to races non-pathogenic to varieties possessing the Bond type of crown rust resistance. Races pathogenic to Bond (201 and 202) were found in Canada, for the first time, in 1938. Only occasional isolates of these races were found during the next few years. But, in 1945, and in succeeding years they increased markedly in prevalence and since 1950 they have comprised upwards of 60 per cent of all isolates. The increase in the prevalence of these races in Canada coincided with an increase in the acreage grown to varieties susceptible to them in the United States.

Races 239 and 240, which are non-pathogenic to Bond, were the most prevalent races in Eastern Canada. Races 201, 202 and 202A, which are pathogenic to Bond, were the predominant ones in Western Canada and they also occurred commonly in Eastern Canada.

A significant increase occurred in certain important races (213, 216, 274 and 279) in 1956. These races, which are pathogenic to both Bond and Victoria, were isolated only occasionally prior to 1956. In that year, they comprised 4.3 per cent of all isolates and the following year, 1957, they comprised 41 per cent of the isolates identified.

Several races (263, 264, 276, 293, and 294), which are pathogenic to Landhafer and Santa Fe, were isolated during the past few years in Canada. In 1957, they comprised 7 per cent of all isolates.

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Tolerance to Full Infection with Crown Rust

by Ralph M. Caldwell, John F. Schafer, LeRoy E. Compton and Fred L. Patterson

Performance tests during the years 1955 to 1957 have provided evidence that the spring oat variety Benton possesses a high and economically important level of tolerance to full infection by crown rust (Puccinia coronata). The variety Benton yielded well when severely attacked by crown rust with little reduction in test weight of grain. This tolerance contrasted sharply with the performance of Clinton 59, a variety of the same breeding as Benton, which in the same tests and, so far as could be judged, under equally severe infection with crown rust, was severely reduced in both test weight and yield.

These comparisons were made by utilizing two pairs of near isogenic lines differing mainly in that one of each pair possessed the Landhafer gene for resistance to crown rust. The pairs were (1) Benton (susceptible) and Bentland (resistant) and (2) Clinton 59 (susceptible) and Clintland (resistant). In the absence of crown rust the members of each pair were approximately equal in yield and test weight. Under severe, artificially induced crown rust epidemics Benton continued to approximate the yield and test weight of Bentland while the yield and test weight of Clinton 59 dropped far below that of Clintland.

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Variable Rust Reactions of Irradiated Floriland to Landhafer Races of Crown Rust

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

Extreme variation in morphological characters was observed in progenies from irradiated Floriland oats; moreover, extreme deviations of rust reactions were observed. Most of these changes are assumed to be the result of atomic radiation. Under field conditions several plants from one family were highly resistant to crown rust race 264 at Quincy, Florida, and race 290 at Gainesville, Florida. Some lines from this family when inoculated with race 264 exhibited a mesothetic reaction whereas other lines showed a reaction type that proved to be a distinct kind of mature plant resistance.

In another family the reaction type was necrotic similar to that exhibited by Victoria. Some selections, when incoculated with race 264, were resistant while Victoria was susceptible; moreover, this resistance was not, in all cases, associated with susceptibility to *H. victoriae*. Lines exhibiting susceptible and segregating reactions to Victoria blight also occurred in this family. Under greenhouse conditions, resistance to races 264 and 290 was found in two irradiated families; however resistance to both races was not combined in a given selection.

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Crown Rust Losses and Protection by Landhafer Resistance in Indiana in 1957

John F. Schafer, Ralph M. Caldwell, Fred L. Patterson, L. E. Compton, and R. R. Mulvey

A severe epidemic of crown rust of oats occurred in Indiana in 1957. The population of *Puccinia coronata* (Pers.) Cda. causing this epidemic consisted primarily of Bond virulent, Landhafer avirulent races on the basis of field observations. A mechanism was available for evaluating the losses due to crown rust in that the oat varieties Clinton 59 and Clintland, which differ only in the added Landhafer type crown rust resistance of the latter, were both widely grown in

Indiana in 1957 and were included in varietal performance tests throughout the state. This comparison also allows for an evaluation of the economic contribution of Clintland, developed by Purdue University and the U. S. Department of Agriculture.

In 7 experimental tests Clintland had an average yield advantage over Clinton 59 of 16.8 bushels per acre. According to farmers' estimates of yields obtained in a survey by the Purdue Department of Agricultural Statistics Clintland had an advantage of 4.76 bushels. The experimental data, corrected to the level of the state average oat yield, indicated a loss of 4,098,000 bushels of oats attributable to crown rust on the acreage sown to susceptible spring oat varieties. The farmer's estimates indicated this loss to be 1,733,000 bushels. The same 2 sets of figures applied to determine the economic contribution of the Clintland crown rust resistance showed a gain of 5,559,000 bushels on the Clintland acreage based on the experimental data or 2,351,000 bushels according to the survey data. The experimental results showed Clintland also to have an average test weight advantage of 4.4 pounds per bushel and to be lodged only 23 per cent versus 52 per cent for crown rust susceptible Clinton 59.

*****

Effects of Rust on Yield
by D. C. Arny, Madison

During the last two years, tests have been made on the effects of rust on yields of certain varieties. Weekly sprayings with Parzate were made in half the plots to control rust. The plantings were made somewhat late in order to favor rust development. Yields in the sprayed plots, with reductions in yield and kernel weight in nonsprayed plots, are shown in the following table:

Variety	1956			1957		
	Yield	Percent	Ker. wgt.	Yield		Ker. wgt.
	Bu.	reduc.	reduc.	Bu.	reduc.	reduc.
Clinton	44	32	22	44	38	33
Branch	51	26	12	45	45	23
Sauk	51	24	26	63	42	13
Rodney	56	28	10	43	24	22
Fayette	38	7	9	52	28	10
Beedee	39	21	6	70	24	18
Clintland	38	18	10	45	0	5
Clarion	--	--	--	53	38	33
Minhafer	--	--	--	40	0	9

In 1956 both leaf rust and stem rust (race 7) were present, while in 1957 only leaf rust (race 216 probably present) was a factor. In 1956 Rodney gave the highest yield, and Sauk gave the highest kernel weight. In 1957 Fayette and Beedee appeared to have some leaf rust protection not present in Branch or Sauk. Beedee was the highest yielder, even without rust control. Minhafer was highest in kernel weight, with Beedee only slightly lower.

Studies on barley yellow dwarf virus

In field and greenhouse tests, certain lines have appeared to have some tolerance to the red leaf disease. Saia (CI 4639) has remained the most resistant, with Glabrota (CI 2630) somewhat less so. Among the 21 chromosome oats, CI 1012 (Old's White Kherson) and CI 1050 (Iowa 103) have shown some tolerance which might be useful. CI 6668 has also appeared to have a degree of tolerance.

Mr. Gert Orlob, a graduate student, has been studying the relation of various aphid species to the spread of the virus in the field. He is attempting to get a better understanding of the movement and build-up of the various species through the season, and is correlating this with disease development. He has found that the bluegrass aphid Rhopalosiphum poae Gilette can serve as a vector in addition to those already described.

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Vector Specificity Among Isolates of Barley Yellow Dwarf Virus

W. F. Rochow

Although the apple grain (AG) aphid (Rhopalosiphum fitchii (Sand)) has been found to be the best vector for barley yellow dwarf virus, the English grain (EG) aphid (Macrosiphum granarium (Kirby)) transmitted more isolates of the virus from oats in New York than did AG aphids. A detached-half-leaf method was used to compare virus transmission by these two vectors. Thirty-two samples of oats with symptoms of infection by barley yellow dwarf virus from 10 New York counties were tested by this method in 1957. Virus was recovered from 26 of these samples by EG aphids only, from 2 samples by AG aphids only, and from 1 sample by both aphids. This relatively poor transmission by AG aphids occurred with all 3 collections of AG aphids studied. Further tests with some of the virus isolates of the relative transmission by the two vectors were in general agreement with results of the original transfer from the field samples. EG aphids continued to transmit EG-specific isolates very efficiently, and AG aphids continued to be very efficient in the transmission of all AG-specific isolates. Occasionally, however, AG aphids transmitted an EG-specific isolate. Preliminary data from 4 isolates indicated that the virus involved in these occasional transmissions by the "other" aphid was the same as the original isolate with respect to subsequent relative transmission by the two vectors. In other words, the occasional transmission of an EG-specific isolate by AG aphids did not result in selection of an isolate readily transmitted by AG aphids. These preliminary results of studies on the mechanism of vector specificity among isolates of barley yellow dwarf virus indicate that the vector specificity of some isolates of the virus is relative and not absolute.

*****

A Non-Parasitic Leaf Spot of Oats

A. L. Hooker (U.S.D.A.) Wisconsin

Non-parasitic leaf spots of various types occur on certain oat strains. Several of these strains were grown and observed frequently during the 1956 and 1957 seasons at Madison, Wisconsin. Leaf spots developed on the varieties Craig, Burnett, Karella (C.I.2774), G.A. 50 (Erban x Boone selection), and P.I.197279. Field symptoms were observed to appear following 6 or 7 days of warm-dry weather which had been preceded by a cool-moist period. Symptoms were reproduced in the greenhouse by moving plants from a temperature of 16°C. to a moist chamber for 12 hours and then to a temperature of 28°C. Rapid drying of the foliage after the moist chamber treatment increased symptom production. Resistant varieties and check plants maintained at 16°C. expressed few if any symptoms. Symptom expression in the greenhouse was most pronounced on G. A. 50.

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Problems in Breeding for Resistance to *Septoria avenae*

A. L. Hooker (U.S.D.A.) Wisconsin

Breeding for resistance appears to be the most feasible method of control for the Septoria disease incited by *Septoria avenae* Frank. This pathogen infects the leaves, culms, glumes, and kernels of the oat plant. Disease reaction in these plant parts is positively correlated but negatively correlated with heading date. Early maturing varieties or selections, however, differ significantly in disease reaction indicating a response to disease which is independent of maturity.

Of the named varieties evaluated by means of artificial inoculations made in each of 2 or 3 years; Ajax, Clintafe, Clintland, Clinton, Craig, Gopher, Kanota, Mohawk, Roxton, and Victory had the lowest combined leaf, stem, and kernel infection scores, whereas Cherokee Reselect, Clarion, Fayette, Logan, Newton, and Putnam had the highest combined infection. Oat strains with the C.I. numbers 1090, 1251, 1591, 1592, 1638, 1923, 2027, 2173, 2254 and 3806 have had consistently low disease scores.

S. avenae is a variable pathogen. Cultural and pathogenicity studies have demonstrated that starting with a single macrospore of *S. avenae*, sub-cultures that are both more and less virulent than the original may be derived if divergent selection for pathogenicity is practiced for several vegetative generations. Selection for decreased virulence, however, was more effective than selection for increased virulence. Variability in virulence in *S. avenae* appears to be quantitative rather than differential.

Studies on the inheritance of reaction to *S. avenae* were conducted employing F_2, F_3, F_4 progenies of several resistant x susceptible crosses. F_2 plant scores and F_3 means closely followed a normal distribution with infection means approximating the average of the parents. Heritability percentages using F_3 and F_4 data and the components of variance method of estimation ranged from 41 to 93 for leaf infection and from 48 to 72 for stem infection. Heritability estimates in 4 F_2 populations using the average variance of the 2 parents as an estimate of environmental variance ranged from 83 to 86. Heritability estimates using parent-offspring regression were higher when disease scores were determined from replicated plots than from individual plants.

The data obtained suggest that Septoria reaction should be treated as a quantitative character in the breeding program.

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Varietal Reactions to a Yellowing Condition of Oats in South Carolina in 1957 (Abstract)

W. P. Byrd and R. W. Earhart

During late March and early April of 1957, a yellow chlorotic condition of oats appeared widespread in the Piedmont Area of South Carolina. The cause of this chlorosis proved to be unlike a similar condition previously observed in the Coastal Plain area which was associated with soils of high pH. Further investigations demonstrated that there were specific varietal reactions to this condition. The varieties expressing the most pronounced yellowing tended to be those with the more "upright" or "spring-type" manner of growth. The oat varieties appearing in the uniform agronomic nurseries were evaluated for their reactions to this particular condition. These varietal evaluations are reported together with the correlation data indicating that this condition was responsible for a decided reduction in yield.

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Effect of Seed Treatment on Control of Smut in Kanota Oats, 1954 to 1957

Earl D. Hansing
Plant Pathologist, Kansas State College

Experiments were conducted in the field nursery from 1954 to 1957, inclusive, comparing new fungicides with older ones to determine their relative value as seed treatments to control loose and covered smuts in Kanota oats. The seed was inoculated by the partial vacuum method and then after the seed was dried, treated with the different materials. After different periods of storage the seed was planted in triplicated 10 foot rows.

Satisfactory control of smut was obtained with the combination liquid fungicide ethyl mercury 2,3dihydroxypropyl mercaptide and ethyl mercury acetate (Ceresan 75, Ceresan 100, and Ceresan 200). These new fungicides are recommended for seed treatment of oats in 1958. Other fungicides recommended are cyanomethylmercury-guanidine (Panogen 15 and Panogen 42) and ethyl mercury p-toluene sulfonanilide (Ceresan M and Ceresan M-2X).

Phenyl mercury urea (Agrox), phenyl mercury acetate (Setrete, and Mersol 7), and combinations of phenyl mercury acetate and ethyl mercury acetate (Liquid 244, Liquid 364, Liquid 365, and Mersol 51) were not satisfactory in the control of smut. Combinations with a higher ratio of ethyl mercury acetate resulted in better control of smut.

Methoxy ethyl mercury acetate (Mema and Mema-sol) at lower rates of active chemical was not satisfactory; however, at a higher rate (Mema RM) it resulted in comparable control in 1957.

Ethyl mercury nitrile (BB-67), methyl mercury 8-hydroxyquinolate (Ortho LM), and N-ethlymercuri- 1,2,3,6 tetrahydro-3, 6-endomethano-3,4,5,6,7,7-hexachlorophthalimide (Emmi) were satisfactory for control of smut in 1957.

In regard to combination fungicide-insecticides satisfactory control of smut was obtained when cyano-methylmercury-guanidine was included as the fungicide (Drinox P-15, Panogen 15 + Drinox, and Panogen 15 + Drinox H-34) but not when phenyl mercury acetate was used (Heptachlor-mercurial).

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Cause of and Losses from Abnormal Blast of Oats in Central Iowa in 1957

J. Artie Browning and K. J. Frey

Blast, a disease of oats which may be caused by any condition which adversely affects the plant during the critical period of spikelet differentiation and panicle elongation, was epiphytotic in central Iowa in 1957. Iowa oats had superimposed over normal blast (which affects spikelets near the base of the panicle and near the central axis) abnormal blast in which spikelet differentiation was arrested at the upper, middle or lower part of the panicle, depending on the stage of development at the time of some catastrophic causal event. I. V. Holt has shown that the critical period of spikelet differentiation at Ames, Iowa falls about 30-36 days after planting and about 20 days before heading. Replicated yield nurseries were planted April 10, 1957 and varieties which suffered greatest loss from blast headed about June 14. Counting from these known dates, the critical period fell during a period of abnormally cold, cloudy weather May 16-20. The abnormal blasting probably was caused by these conditions. Moisture was not deficient at any time during the growing season.

From counts made in two replications totaling 228 plots of the Red, North Central and Iowa Elite Oat Nurseries calculations were made of 1) the percent blasted heads per variety, 2) the percent blast on normally and abnormally blasted heads, 3) the compensatory effect on kernel weight, and 4) the effect of abnormal blast on yield. Data were analyzed by heading dates for the different entries. Except for very early varieties, there was a negative but non-significant correlation coefficient between percent of blasting and number of spikelets per head. However, totals for the experiment gave a negative and significant correlation coefficient of -.20. Lines heading out on June 8-9 had no blast whereas, lines heading out June 14 suffered the greatest percentage of blasted panicles, and of blasted spikelets on abnormally blasted panicles. Ratios of weights of seed from abnormally blasted panicles to that of seed from normally blasted panicles ranged from 1.09 to 1.25. Correcting for percent of normal blast and greater weights of seed, the percent yield loss from abnormal blasting was calculated to be 0.0, 7.2, 9.3, 11.5, 14.6, 11.2, and 8.7 percent for lines heading on June 8-9, 10-11, 12, 13, 14, 15-16, and 17-21, respectively.

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Greenbug Resistance in Oats

Harvey L. Chada, Entomologist, Ent. Res. Div.,
U.S.D.A., Denton, Texas

In the 1956 National Oat Newsletter it was reported that 77 varieties of 4998 in the world oat collection were found to have greenbug resistance of significance, based on a plant injury tolerance test. During 1957, 74 of the 77 varieties were subjected to further, more intensive tolerance and antibiosis tests in a controlled environment insectary. Most of the 74 varieties showed greater resistance than the resistant check, Andrew C.I. 4170, in at least one of the three testing categories - longevity of infested plants, plant injury, and antibiosis -, but there was a trend toward correlation between the resistance ratings in all three categories. Several of the varieties had marked resistance when subjected to heavy greenbug infestation for a considerable period. In some only segregates showed resistance. These resistant segregates were transferred to pots in the greenhouse, after the infestation was eliminated, in an attempt to obtain seed for further study. Segregates or mixtures have been sources of resistance in other crops, and they are of importance in a resistance breeding program. Seed stocks maintained as they were originally received are more apt to yield these segregates than are pure lines in which they might have been eliminated.

The ten most resistant world oat collection varieties, based on total of best rank in each of the three testing categories, are presented in the following table:

			Tolerance compared with Andrew (percent)			
Variety	C.I. No.	Source	Longevity 1/	Plant injury 2/	Antibiosis 2/	Rank
Unknown	183992	Yugoslavia	171 +	46	83	1
Avena Selecta M.C. 41374 I.F.	186270	Argentina	138 +	65	50	2
Unknown	183990	Yugoslavia	143 +	76	33	3
7505-43, C.I. 5608	186609	Brazil	186 +	84	50	4
Russian No. 77	2898	Canada	129 +	66	67	5
Unknown	183991	Yugoslavia	157 +	52	150	6
Unknown	190584	Argentina	152 +	85	17	7
(Bond-Rainbow) x (Hajira-Joanette)	5945	Minnesota	143	82	17	8
Unknown	177788	Turkey	157 +	86	67	9
Bonda x Santa Fe Sel.No. 3692-4	6443	Idaho	119 +	65	67	10

1/ Andrew taken as 100 per cent. Highest percentages indicate greatest res.
2/ Lowest percentages indicate greatest resistance.

It was indicated that Yugoslavia and Turkey, in the Mediterranean Region, and Argentina may be good sources of greenbug resistant germ plasm in oats.

There now are several oat varieties with greenbug resistant germ plasm for use by plant breeders as a result of screening and testing the world oat collection. Varieties with resistance of significance were not available previously.

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Policy Concerning Maintaining Breeder's Seed
Dale A. Ray

The 1954-55 International Crop Improvement Association standard for necessary purity of varieties on field inspection has raised several questions of concern to oat breeders and the oat variety certification programs. As you know, in order for an oat variety to pass field inspection for certification, a field now must not be found to contain more than 1 off-type plant per 5000 plants. The practicability of this purity standard was questioned at a recent meeting of the international organization, however no action for revision was taken. Certain areas have found this standard to be difficult in two respects. First, the inspectors are very reluctant in adjudging slightly off-type plants in certain varieties or in making the 5000 plant count, and, second, off-type plants are being found to occur more frequently than the standard by genetic nature within certain varieties, even immediate to a breeders' seed source. It would appear that the standard is excellent in terms of maintainance of varietal purity but offers a considerable challenge and responsibility on the shoulders of the breeders in respect to the release and maintenance of pure-breeding varieties. The inspectors in certification work now are concerned with carrying this responsibility.

What shall be our course in light of these circumstances and our contribution to the solution to the problems of the certification programs? Certainly the breeders' efforts would be lost if the certification programs were to disregard variety purity. It now appears that there is some question as to legitimate attempt to abide by the standards of number of permitted off-type plants. With the current list of improved varieties available and recommended, certainly every effort possible should be made to maintain and improve purity. In many cases, we have learned to accept a limited amount of speltoid types in varieties derived from certain parentage. Speltoids and possibly mutations have been observed to occur at a higher frequency than the current standard of 1 in 5000 plants.

A course for the present and a course for the future now appears inevitable. First, the breeders perhaps should consider the development of a repurification-under-isolation program for those varieties now being certified. This is a time-consuming and costly operation but appears to be the only solution in certain instances of varieties that by nature fail to offer promise of conformity to the purity standard. This effort would be the responsibility, by necessity, of the breeder concerned with the original release of each variety. Isolated head-row purification seems to be dictated in these instances, followed by breeders' duty in following the performance and purity of the variety on release to seed growers. In regard to future efforts of oat breeders, the purity and its stabilization for each newly-released variety must receive even more close consideration than in previous years in isolation plots. Perhaps we have to avoid the use of certain parentage, or in making certain otherwise desirable selections, if the purity or high potential for speltoids is questionable in the result.

At this time, I would entertain an expression of your feelings on this matter and any suggestions which you may offer in regard to action that should follow for conformity with the standard of purity for oat variety certification. I am certain that our certification organizations are concerned and interested in any action which we might take on this question.

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Results of Current Oat Investigations at Winnipeg

by J. N. Welsh and G. J. Green

A preliminary investigation to determine the possibility of separating the hypothesized B and C genes for stem rust resistance was unsuccessful. These investigations will be continued in order to determine the validity of the two gene hypothesis. The existence of a new gene for stem rust resistance, designated as Gene E, has been established. This gene is possessed by the variety Jostrain and controls resistance to races 1, 3, 4, and 11. Two other varieties, Canuck and Roxton, which have Jostrain in their parentage also have this gene. Canuck has genes B, C, and E, while Roxton has gene E, only.

Two new stem rust races, 8A and 13A, were identified in Canada in 1957. Both races were isolated from rust cultures obtained from Ste. Anne de la Pocatiere, Quebec. White Russian and its derivatives, which possess gene D, are resistant to race 8A, while Jostrain and Canuck are the only varieties observed so far to have resistance to 13A. Unfortunately, the reactions of these varieties to this race is of the mesothetic or (X) type and therefore the resistance is not of a high order.

A number of varieties were tested for their reaction to races 8A and 13A. The reactions of certain varieties to these two new races as well as to all other known races of stem rust is given in the following table. It will be noted that C.I. 7098 and C.I. 7145 (Land.-Mind.-H.J.) x Andrew have genes A, B, C, D for resistance and therefore are resistant to all races except 13A.

Oat Varieties and the Genes that Govern Their
Resistance to Groups of Oat Stem Rust Races

	A	B	C	D	E	
Varieties	7A12357 12	12357 12	468 10 11 13	12588A 10 11	134 11	13A
C.I. 7098	R	R	R	R	S	S
C.I. 7145	R	R	R	R	S	S
Garry	R	R	R	S	S	S
Rodney Sels.	R	R	R	S	S	S
Richland	R	S	S	S	S	S
Rodney	S	R	R	S	S	S
Canuck	S	R	R	S	R	R
Cherokee	S	S	S	R	S	S
Roxton	S	S	S	S	R	R (X)
Jostrain	S	S	S	S	R	R (X)

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Selection for Yield in a Recurrent Selection
Program - by J. E. Grafius and F. A. Wiebe

A geometrical interpretation of yield gives the biologist an important leverage in selection. Yield (W) is a product of heads per unit area (X) kernels per head (Y) and kernel weight (Z), all expressed as percent of the mean of a sample population. It can be shown that it is sometimes more profitable to select for one edge than for two or even three edges.

As a general statement, when the heritability of a given edge is low it may be better to concentrate on the remaining two. In the example given, more progress could be obtained when selection was based on either Z alone, or on the product XZ, than when one selected for yield <u>per se</u>. The logic of this situation is apparent when it is observed that the heritability of X was zero. The effects of X were found in W but the variation in W caused by X was entirely fortuitous.

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Progress Report on the Production of Monosomes in Cultivated Oats

K. Sadanaga

A program to produce monosomes in the cultivated variety Cherokee through irradiation with X-ray has been initiated. Panicles of Cherokee were irradiated with doses of 300 and 600 r. Seeds harvested from the irradiated panicles were sown in pots in the greenhouse and these X-1 progenies were screened for the presence of micronuclei in the tetrad stage. Plants having abnormal tetrads (presence of micronuclei) were saved and critical examinations of diakinesis, first metaphase or first anaphase stages were carried out on available microsporocyte samples. Critical stages of meiosis or good slide preparations in same samples were not obtained. Of those critically examined, 53 were found to be monosomes. Nine monosomes were sterile and fertility in the others ranged from 1 seed per plant to as high as 50 percent. Monosomes could not be distinguished phenotypically from normal plants with certainty. Therefore cytological examination of microsporocytes is still necessary in distinguishing monosomes from normal plants.

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Influence of Ploidy on Biological Effects Produced by Ionizing Radiations in Oats

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

Two varieties of oats, Saia ($2n = 14$) and Minhafer ($2n = 42$), were used in this study to measure the influence of ploidy on the biological effects produced by the radiations. The seed lots were exposed to 5,000 r, 10,000 r, and 15,000 r of X-rays and $1.02 \times 10^{13}/cm^2$, $1.20 \times 10^{13}/cm^2$, and $2.04 \times 10^{13}/cm^2$ of thermal neutrons. From each treatment and the controls 480 seeds were planted. The survival fraction and plant height in inches were measured at maturity and expressed in percent of the checks.

Saia exposed to 5,000 r X-rays had the same survival as the check. But its survival percentage decreased to 72.5 per cent at 10,000 r and dropped further to 8.5 per cent. This type of survival curve was also observed with the thermal neutron treated series. Minhafer, on the other hand, had only a gradual decrease in survival percentage with increasing dosage of either X-rays or thermal neutrons. These results seem to indicate that the higher tolerance to radiation in Minhafer was provided by the reduplication of genes or the increase of chromosome number.

The radiation effect on plant height was contrary to that on survival. In other words, the decrease in plant height in Minhafer was greater than that in Saia. The explanation may be this: The gross chromosomal aberrations that would cause a death in diploids would presumably cause only a reduction in growth vigor in hexaploids, so Minhafer should have a higher proportion of plants with poor growth. As a result, a higher reduction in plant height on the average was observed in Minhafer.

The pigment-deficient mutation rates were measured in the second generation. More than 10,000 panicle progenies were screened for seedling mutations. Saia gave a mutation rate of about 15 percent at 15,000 r and about 9 percent at the highest dose of thermal neutrons applied. Minhafer had a much lower mutation rate, about 1.8 percent at 15,000 r and about 2 percent at the highest dose of thermal neutrons. This result again verifies the hypothesis advanced by Stadler that the phenotypical stability in hexaploids is achieved by the reduplication of genes.

The mutation spectrums for Saia and Minhafer were quite different. In Saia the most frequent mutations were albinos and light greens while in Minhafer the most common types are light greens and a special type which showed a depigmented segment on the second leaf. Stripes were also found more often in Minhafer than in Saia. Whether X-rays produced mutations in a different manner from thermal neutrons cannot be determined although X-rays and thermal neutrons produced these mutations in somewhat different proportions. In producing mutations, measured on the same survival level, the thermal nuetrons appear to be more effective than X-rays.

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Temperature Effects on Meiosis in a Heterozygous Translocation Progeny of *Avena strigosa*

F.K.S. Koo and M. Tabata

A few days before the microsporocytes were collected, a portion of the progeny of a heterozygous translocation stock of Saia was exposed to the high temperature (85°F.) and the others were left at 68°F. as control.

This study was designed to examine the effects of high temperature on the chiasma formation in general and on the orientation of ring of 4 on MI plate in particular.

The 7II plants and ring of 4 plants in the control formed 13.1-14.4 chiasmata per cell on an average but the plants exposed to 85°F. produced only 8.9-12.9 chiasmata per cell, indicating that the high temperature had a disturbing effect on chiasma formation. In the plants treated at 85°F., more rod bivalents were found. The proportions of ring bivalents versus rod bivalents observed may be expressed in ratio and the change in ratio may be taken as a valid measurement for the change in chiasma frequency. In the high temperature treated plants, a great number of cells (ranging from 22-77 per cent in different plants) were found to have 1-8 univalents. In addition, trivalents were also observed occasionally in the high temperature series. The trivalents formed in the 7II plants probably resulted from illegitimate associations due to chromosome stickiness and those found in the ring of 4 plants probably resulted largely if not all from ring of 4's each with one chromosome detached. Analyses of variances for the average number of chiasmata, ring bivalent-rod bivalent ratio, and univalent frequency indicate that the variances between the treatments were much larger than those within the treatments. Therefore the differences in these measurements at two temperature levels were significant.

Two more facts may be also taken as good indications of reduction in chiasma formation prompted by the high temperature: 1) The cells with ring of 4 in different control plants ranged from 79-98 per cent but only 54-80 per cent in the high temperature series, indicating that a ring of 4 in many cells exposed to the high temperature was not formed but instead two bivalents were formed. 2) The formation of chain of 4 was much more frequent in the high temperature series than that in the control.

Two types of orientation of ring or chain of 4's on the MI plate were observed. It appears that Saia grown at 68°F. had a random or non-directed type of orientation, giving 1 zigzag type : 1 open type. But in the plants subjected to 85°F. fewer zigzag types were produced. The reduction in this type of orientation was significant statistically.

All the results in this study point to the conclusion that the high temperature was capable of reducing the chiasma frequency and disturbing the random orientation of ring of 4's on the plate. But all these were just the end expressions of the high temperature effects upon chromosomes. What mechanism in meiosis was really affected or distrubed by the high temperature and how this effect proceeded and led to the end results are not entirely known. Detailed results and possible explanations will be presented elsewhere.

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The Present Status of Genetic Studies of Rust Resistance in Oats in Minnesota

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

A. With a total of 77 crosses involving Landhafer, Santa Fe, Bage, Trispernia, Bond, Victoria, Moravia-2, 64 Q, Ascencao, Criolla Saltena, DeArgelia, Dom Pedrito, La Prevision, and Gopher tested to races 203, 216, 258, and 276 of crown rust, five major sources of crown rust resistance are detected.

1. Landhafer has a single dominant gene (being partially dominant in some cases) conditioning resistance to races 203, 216, and 258.

2. Santa Fe appears to have a major gene governing the resistance to races 203, 216, and 258, and two other gene-complexes for resistance associated with the major gene in inheritance. The existance of these two gene-complexes is also indicated in Bage and Trispernia. One of the complexes is responsible for resistance to races 203 and 216, and the other to race 258.

3. Bond appears to have a single recessive gene (or partially dominant) conditioning resistance to race 258. The expression of this gene can be suppressed by inhibitors present in other susceptible varieties.

4. Victoria has a gene-complex which conditions resistance to the crown rust races 203 and 276 and susceptibility to *Helminthosporium victoriae*. Moravia-2 and 64 Q appear to have the same gene-complex as Victoria. All these three varieties and several other susceptible varieties seem to possess an inhibitor which suppresses the expression of resistance to race 216 in Ascencao.

5. Ascencao has two independent dominant genes, one of which is identical to the gene-complex in Victoria in reaction and the other is responsible for resistance to race 216. The latter appears epistatic to the former as far as resistance to race 203 is concerned.

B. From studies of Saia x *A. brevis* (C.I. 2514) and *A. strigosa* (C.I. 2524) x *A. strigosa* (C.I. 3785), four genes with distinct reactions of resistance to both races 276 and 216 of crown rust are indicated.

In the first cross, Saia appears to possess two independent dominant genes A and B for resistance, with A (giving Type 0;) being epistatic to B (giving

Type 2). In the second cross, each variety carries a dominant gene for resistance. The gene C conditions immunity and the gene D the Type 1 reaction. It appears that an intermediate reaction results when C and D are present in certain combinations.

Because there is no susceptible F_2 plants recovered in these studies, it is speculated that some common genetic background for resistance may exist in the parents within each cross.

C. From the studies of F_2's to race 6 of stem rust in the crosses of two African hull-less varieties, two Chinese cultures, and two Kherson selections with Victoria-Hajira-Banner, a new gene conditioning the 'X' type of reaction is detected.

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Lodging Resistance in Oats
K. J. Frey

Better lodging resistance in oat varieties may well be the number one problem facing oat breeders today. It would appear that the Oat World Collection contains a number of strains which can be used to improve the straw strength of agronomically desirable varieties, e.g., C.I. 5154, C.I. 5155, C.I. 5545, C.I. 7317, C.I. 7318.

The "snap score" and "cL_r" methods of testing for lodging resistance of oat strains both gave data which were highly correlated with natural lodging percentages. However, when trained personnel is available and the oats are planted in rows the snap test is probably more economical and perhaps more repeatable than the cL_r method is.

The heritability percentages of lodging resistance (cL_r method) between the F_2, F_3, and F_4 generations of oat crosses were disppointingly low, ranging from 0 to 35. There is some indication that lines selected from oat varieties may differ in lodging resistance. Perhaps before crossing two varieties to combine genes for lodging resistance the varieties should be purified with selection of the strongest ones to use in crosses.

In two years the lodging resistance of oat varieties developed differently. In one it decreased until the grain was in the dough stage and then increased, whereas in the other year it increased throughout the grain maturation period.

Lodging resistance was found to be closely associated with stem diameter and cross sectional area of stem tissue. Height was negatively and yield per panicle was positively correlated with cL_r readings. These data confirm previously published reports on association between stem characteristics and lodging resistance.

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Lodging of Small Grains and its Pattern as Concerned with Oats

N. I. Hancock

The pattern of growth in culms of oats is very similar to that in barley, wheat and rye. The internodes become longer and heavier; their circumferences and wall thickness smaller and thinner from ground level to panicles and spikes. The internode subtending the head is considerably the longest, and its weight plus that of head, over 50%, constitute about 65% of the culm's weight. This top heavy condition in the green stage has been alleviated by nature endowing the culm with a great deal of resiliency. Also the tapering of internodes is an aid to resiliency. Tapering averaged 1.5% in 111 cm. of an oat culm. But culms are harvested by combine in dead ripe stage and at this stage they have lost water and in turn a large amount of resiliency. Their internodes are weakened and they are liable to lodge when exposed to even small forces of rain-storms.

Three changes in the growth pattern are suggested to reduce lodging at dead ripe stage, based on theorums in physics. Grafius and Brown (3) were the first to publish as approach of this kind.

1. Change nodding angle: The strength varies directly as center of loading from vertical axis of culms, then the nodding angle should be as small degree as possible so that weight of head remains on center of vertical axis of culm. Forkedeer, very susceptible to lodging, has large angles of nodding while LeConte, very resistant to lodging, has small angles. A method of measuring this angle is given. This quantitative character is heritable and is not influenced by environment as much as height. In this respect no data can be presented in this short discussion. A simple correlation of .721 was obtained on nodding angle versus lodging percentage. The plant breeder can learn to recognize variations in the nodding angle in the same way as plant pathologist recognize them in readings of leaf rust.

2. Reduce height of culm: It is commonly recognized that a short variety has less surface exposed to the forces of rain-storms than a tall one. The increased use of nitrogen as well as the general effort to improve levels of soil fertility will result in more lodging of tall varieties. A simple correlation of .610 was found for height versus lodging percentage on 200 head rows in 1948. This population represented F_3 of cross between LeConte a tall variety and Fulgrain 4 a medium short variety. In such studies one must avoid confounding the nodding angle and stiffness of straw with height, by selecting the varieties which have measurements as similar as possible in these two characters.

3. Change composition of straw: At the dead ripe stage culms of all small grain crops become fairly rigid. But varieties within crops vary considerably in this respect as shown by their lodging percentages. Data taken in field in 1956 and 1957 showed that lodged oat culms had the greatest percentage of breakage at 2nd and 3rd internodes. The character of composition is a very difficult one to measure. A theorum is suggested as follows: That strength varies inversely as (the mean diameter times the mean wall thickness).[3] This theorum has not been given a thorough test, but significant differences were noted between values calculated on diameter and wall thickness of Forkedeer and LeConte. No one of these

three major changes will answer the problem of lodging. But values of these variables can be pooled and calculated as multiple correlation for an index, Grafius and Brown (4), Hamilton (5). If the data are of linear order slope of regression lines will give direction the selections are taking.

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Improvement of the Mechanical Strength of Oat Straw

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The culm of a mature oat plant may be regarded as a tapering column fastened at the base. The column is divided by the nodes into internodes of varying lengths. The nodes are solid but the internodes are hollow. Each internode is partly or completely enclosed by a leaf sheath which is attached at its base to the node.

The material in the walls of the culm (column) consists of tissue zones made up of different types of cells. From the outside inward the tissues of the culm are the epidermis, sclerenchyma and the included peripheral vascular bundles and pith including the inner ring of large vascular bundles surrounding the hollow center. All of the cells of the culm contribute to the strength of the culm but the most important cells are the thick-walled fibers in the sclerenchyma. The pith except for the vascular bundles consists of thin-walled parenchyma.

The thickness of the tissue zones, and the chemical composition and the thickness of the cell walls of the different tissues are known to vary. There is variation from node to node in a given culm, among varieties and among varieties in response to different environments. These variations have been shown to be related to the mechanical strength of the culm. It is not known how much difference in cell wall composition and in the structure of the tissues is necessary to make a significant difference in straw strength. Neither is it known whether the same kind and amount of histological variation will affect all varieties in the same way.

It seems that the problem of improving the mechanical strength of oat straw should be approached in the following way. First, observe and describe the histological characteristics of a number of oat varieties representing a range of varieties classified as weak to strong based on field behavior. Second, apply mechanical or other tests of straw strength to the oat varieties and observe the histological characteristics of the tested culms. Third, relate the mechanical test to the histological characteristics and determine the differences in the histological characteristics that are significant in terms of the mechanical tests. Fourth, study the histological characteristics of a range of strong and weak strawed varieties in different environments and apply mechanical tests. By following the above procedures it should be possible to interpret histological characteristics in terms of mechanical tests and conversely. Once these relationships are understood selection for mechanical strength of straw should proceed with greater precision and certainty.

The following literature citations and their citations have been helpful in a study of lodging in wheat and oats.

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Yield, Tiller Production and Seed Weight of Six Oat Varieties

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Six varieties of oats grown from 1954 to 1957 at Aberdeen, Idaho were analyzed for the yield components; tillers per plant, weight per 1,000 kernels and number of seeds per plant. Cody, Victory, Roxton and Markton produced higher yields than Palestine and Andrew. Palestine produced the greatest number of culms per plant and the highest kernel weight but was lowest in test weight. Cody produced the smallest seeds, but had a satisfactory test weight and yield, as well as the greatest number of seeds per plant. Victory produced the highest bushel weight. Yield and kernel weight were not correlated while yield and culms per plant were negatively correlated. There was a positive correlation between yield and seeds per plant. Negative correlations were obtained for test weight and kernel weight and also for seeds per plant and kernel weight.

Table 1. Agronomic data on six oat varieties grown at Aberdeen, Idaho, 1954-1957.

Variety	Yield bu./A.	Culms/ Plant	Seeds/ Plant	1000 Kernel weight grams	Test Weight lbs./bu.
Palestine	135	2.9	54	38.2	33.7
Andrew	137	1.9	65	31.2	39.1
Markton	151	1.8	72	33.4	38.8
Victory	153	1.4	78	32.6	40.8
Roxton	153	1.2	63	37.7	38.2
Cody	155	1.9	80	27.7	39.1

Table 2. Correlation coefficients between yield and other characters of six oat varieties grown at Aberdeen, Idaho, 1954-57.

Characters	r
Yield and kernel weight	-.30
Yield and culms/plant	-.47*
Yield and seeds/plant	+.64**
Kernel weight and bushel weight	-.64**
Kernel weight and seeds/plant	-.66**

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Rate of Seeding and Variety of Oats in Relation to Grain and Forage Yields

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Experiments were designed to determine whether conventional planting rates were suitable for the newer varieties with larger kernel size. Forage and grain yields were obtained from rate of seeding trials in nursery plots for 7 varieties. These were Mo. 0-205, Clintland, Newton, Bentland, C. I. 5962, C. I. 6933 and Putnam in order from smallest to largest kernel size. Four seeding rates were used for grain yields and the 3 higher ones for forage yields. Rates of seeding ranged from 29 to 88 pounds per acre for Mo. 0-205 at one extreme and from 40 to 120 pounds for Putnam at the other in order to seed the same number of viable seeds per plot for each variety at each of the 4 rates. Grain yields were studied in 1955 and 1956 and forage yields in 1956 and 1957.

In spite of the precautions of relating planting rate to seed size and per cent of germination plant establishment varied between varieties and between rates with the lower rates giving better percent establishment in 1955 and 1956.

The number of plants and number of tillers were determined for the entire plot harvested for grain. The averages of these plots were used to estimate stands and tillers in adjacent plots harvested for forage.

For the main experiment forage yields were taken at the early dough stage to get an estimate of the production of oat silage. Other stages of forage harvest were used in an additional experiment in 1957.

Differences in tillers per plant between varieties and between rates of seeding were highly significant in both 1955 and 1956 with the lower rates of seeding having higher numbers of tillers per plant but lower numbers of tillers per plot.

Differences in rate of development for different seeding rates were less than a day as measured by date of heading but were significant when measured as percent moisture for the forage harvest.

Differences in grain yield between varieties were highly significant in 1955 and 1956 and those between rates significant only in 1956. Higher yields were associated with higher rates of seeding. Interactions between varieties and rates were significant both years.

For forage yields the differences between varieties and between rates were highly significant in each year. Interactions of varieties x rates were not significant. Bentland ranked first in forage yield but was lowest in grain yield. Mo. 0-205 and Putnam were low in forage yield.

The average forage yields of Bentland and Clintland, harvested at early boot, flowering and dough stages in 1957 and the changes in percent dry matter are presented in table 1. Total yields increased rapidly from early boot to flowering and gained more slowly from flowering to the dough stage. The percentage dry matter increased rapidly as the plant approached the dough stage.

From a management standpoint, if harvest is delayed to the dough stage, only a very short period remains when forage satisfactory in moisture content for silage can be obtained. Little loss in yield would occur by harvesting earlier in the after flowering stage and a greater flexibility in management is obtained.

Table 1. Yield of silage and percent dry matter of forage of oats harvested at various periods.

	Stage of harvest					
Variety	Early Boot	Flowering	Dough	Early Boot	Flowering	Dough
	T/A	T/A	T/A	%	%	%
Bentland	7.5	14.0	16.3	13	23	38
Clintland	6.4	14.5	17.3	12	25	38

The Fermentation Characteristics of Oat Silages Harvested at the Boot, Milk and Dough Stages

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The fundamental objective underlying all attempts at the conservation of oats as a forage crop is to effectively preserve the nutrients in a palatable condition. The chemical and physical properties are known to change with advance in maturity, and these in turn influence the fermentation taking place in the silo. The efficacy of the ensiling process as a means of storing and preserving a crop can be partially evaluated by taking into account the extent and type of fermentation. Inspection of a number of oat silages made by farmers and harvested at the dough stage revealed faulty fermentations. An experiment was conducted to determine the fermentation characteristics of Clintland oats harvested at the boot, milk and dough stages. The silage was made in saran plastic bags, vacuumized to 15 in. Hg (by the gauge) and sealed with aluminum clamps. Each silo was tested for pH, titratable acidity, odor and appearance.

Results

No objectionable odors were noted in any of the silages, and the appearance of all silages was good. The results of the laboratory tests for pH and titratable acidity are shown in Tables 1 and 2.

Table 1. Effect of stage of maturity on the pH and titratable acidity of oat silage (no additive)

Stage	Per cent Moisture		pH		Per cent T.A.	
	1956	1957	1956	1957	1956	1957
Boot	80.0	82.0	3.86	4.1	1.72	1.70
Milk	73.1	80.0	4.20	4.8	1.24	1.22
Dough	68.8	77.0	4.68	5.2	1.17	0.30

Table 2. Effect of stage of maturity on the pH and titratable acidity of oats silage (8 lbs. sodium bisulfite per ton)

Stage	Per cent Moisture		pH		Per cent T.A.	
	1956	1957	1956	1957	1956	1957
Boot	80.0	82.0	5.75	5.1	0.24	0.81
Milk	73.1	80.0	5.23	5.9	0.48	0.17
Dough	68.8	77.0	5.95	4.2	0.10	1.40

The oat silage harvested at the boot stage had lower pH values and more titratable acidity than when harvested in the milk or dough stages. The higher pH values obtained with milk and dough stage oat silage indicate that a silage additive would be beneficial in controlling the fermentation.

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The Feeding Value of Oat Silages for Milking Cows

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Oats silage feeding to dairy cattle has generally been disappointing. The evidence from experiment stations and dairymen indicates low consumption of the oat silages by milking cows. Many of the oat silages brought to our laboratory were of low quality as measured by odor, color, appearance and pH.

During 1957 an experiment was conducted to study the feeding value for milking cows of oat silages cut at three stages of maturity: 1) boot, 2) milk and 3) dough in comparison with an alfalfa-ladino-brome grass silage. All silages were made by the direct-cut method with 6-8 lb. of sodium metabisulfite added per ton.

The silages were stored in upright silos.

The moisture contents were 82.0, 80.0 and 77.0 per cent, respectively for the three oat silages as harvested. The moisture contents of the forages as fed were 79.0, 76.5, 70.1 and 74.5 per cent, respectively. The respective pH values were 4.40, 4.65, 4.60 and 4.39. The pH values were normal for silages made with sodium metabisulfite. The silages were scored good to excellent as judged by odor, color and appearance.

The feeding system used limited the hay and grain, but allowed ad libitum consumption of the silages.

The average daily silage dry matter intakes were 21.9, 21.0, 25.4 and 19.9 lb. respectively. The daily FCM produced were 23.3, 21.1, 22.2 and 21.9 lbs., respectively. Although the cows consumed slightly more of the dough stage oats silage, the boot stage oats silage was the more valuable for milk production.

The data indicate that oat silages which undergo a favorable fermentation are readily consumed by milking cows.

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Plans and Procedures for Evaluating Oats for Hay

B. C. Curtis and A. M. Schlehuber

The problem at hand involves the question of whether winter oat varieties differ in hay yielding abilities and quality of hays produced. Results of a yield trial, consisting of ten tall, leafy winter oat varieties, grown at Stillwater, Oklahoma in 1957 indicate that considerable variation exists among varieties with respect to the amount of hay produced (both green and dry weights). No evaluations were made for hay quality. The same yield trial is being grown in 1958 and evaluations for both hay yields and quality will be made on each variety. Plans are to record the following data:

(1) Tiller counts per unit area.
(2) Hay yield (green and dry weights) at the soft dough stage of maturity.
(3) Green and dry weights of plant components: leaves, stems and heads.
(4) Chemical analysis of hay produced.
(5) Chemical analysis of each plant component.

An analysis of the above data should reveal which winter varieties are best for hay production.

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III. SPECIAL ARTICLES

The 1957 Oat Crop

H. C. Murphy

The 1957 oats crop was characterized by extremes. Although total production was close to average for the past ten years, yields varied greatly by sections and even within states. Weather extremes ranged from the record rainfall in the Texas area to drought conditions in the Northeastern region. Record losses also were experienced from diseases in many heavy producing areas. Yields were sharply above 1956 in Iowa, Minnesota, South Dakota, North Dakota, Nebraska, Kansas, Wisconsin and Michigan while crown rust and unfavorable weather caused heavy losses in Illinois, Indiana, Ohio and nearby areas. The Southeastern region was hard hit by a "yellowing" disease along with Victoria blight and culm rot. Crown rust and Helminthosporium victoriae caused heavy losses in Texas and adjacent areas. The cause of the "yellowing" disease has not been definitely determined. It was of major importance throughout a wide area in the Southeastern region.

There were two striking developments in 1957 in the distribution, prevalence and severity of races of crown rust. Victoria attacking races had been gradually building up during the past several years in the Southeastern region and in 1957 they showed a marked build up in prevalence and severity around the Gulf all the way to Mexico. From this area they appeared to spread throughout the eastern portion of the United States and caused heavy damage in the Southern and North Central regions to hitherto moderately resistant Victoria derivatives such as Mo-205, Garry, Branch, etc. An even more significant development was the appearance in epiphytotic amounts in Florida of the Landhafer attacking races 264 and 290. From this area, race 290 appeared to spread pretty much throughout those parts of the United States and Canada which lie east of the Mississippi River. This race was also collected on volunteer oats last fall from several locations west of the Mississippi River. There appeared to be a later and even lighter wave of 264 infection throughout much of the same area. Although genes conditioning "adult plant" resistance to the Landhafer attacking races are known, there appears to be no seedling resistance to race 264 in the hexaploid germplasm.

Septoria caused appreciable damage in limited areas in eastern Canada. In general, however, Septoria, yellow dwarf, stem rust, and other oat diseases did not cause widespread damage to the oat crop in 1957.

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Observation on Oats Grown in Yield Nurseries in The National Cooperative Coordinated Oat Breeding Nurseries in 1956-57

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

On the whole, the season of 1956-57 was above average so far as the national oat yield was concerned. Low average yields in most of the South and East were offset by above average yields in certain North Central States. Hence, total production in 1957 ranked above average although under both 1954 and 1955. The national average acre yield, however, ranked second only to that of 1955.

1. Over-all weather conditions during the 1957 season were neither exceptionally favorable nor too unfavorable for oats. However, conditions differed widely in different areas. In the East, drought prevailed, seriously reducing both yields and test weights. In the South Central States, excessive rainfall resulted in severe lodging and made harvest operations difficult. The latter condition was also true in certain North Central areas.

2. Soil moisture conditions both in the fall and spring differed considerably in different areas. In the fall, soil was deficient in moisture in the East Central area both in fall and spring; whereas, in areas in some of the West, soil moisture was excessive in both fall and spring.

3. The winter of 1956-57 was not exceptionally severe and, whereas some killing was reported, winterkilling was not excessive.

4. The spring of 1957 was backward in the East and seeding was delayed. Hot weather arrived early, the limited moisture supplies were soon exhausted, and the spring oat crop suffered severely as a result.

5. Water for irrigation in most of the Northwest area was ample and yields in the Northwest averaged high on irrigated stations. Conditions were, however, somewhat less favorable than usual in some non-irrigated areas, and below average yields were harvested on many non-irrigated stations in the Northwest.

6. Diseases were unusually destructive in 1957. In the South Atlantic area, losses from crown rust race 216, not previously damaging, were unusually severe. Also, an unidentified yellow leaf trouble seriously reduced yields in that area. Crown rust damaged the crop from the South Atlantic Coast to Texas. *H. victoriae* also damaged Texas oats. Crown rust also was present in the North Central States, but in most of that section the crop escaped really widespread damage from rust, although damage was severe in certain parts of Ohio, Indiana, and Illinois.

7. Several crown rust races not heretofore damaging were present in 1957. In Florida and adjacent States, race 216 was very destructive and the still newer races 264 and 276 were present. In the upper Mississippi Valley still another new race, 290, came in late on Landhafer derivatives. If these three new races, 290, 264, and 276, all of which attack Landhafer and Santa Fe derivatives, become widely prevalent in 1958, then the favorable results of 30 years of breeding for crown

rust resistance in oats will just about have been wiped out. Thus prospects are the oat crop in 1958 may well be facing a situation similar to that in 1928 or prior even to the discovery of Victoria's resistance. There is little object in minimizing the fact that this could prove a national disaster to the some billion dollar oat crop, the third most important cereal grown in this country.

The performance records of the highest yielding entries in each of the different uniform nurseries included in the National Cooperative Oat Breeding Program in 1957 were as follows:

A. FALL SOWN NURSERIES

Yield Rank	Variety or C.I. No. 2/	Yield (Bu.)	Survival per cent	Test wt. (Lbs.)	Plant ht. (Ins.)	Lodging percent	Date Head	Date Ripe	Forage Ratings 3/ percent
	Northern Winter Oat Experiment (20 Stations) 4/								
1	6980 Ballard	55.8	84.4	31.5	41.1	53.0	5/16	6/17	95.4
2	7129	54.4	78.5	29.7	39.9	33.8	16	17	94.9
3	6717	54.2	79.6	30.5	39.2	37.8	17	17	90.9
4	7132	53.9	75.6	33.2	40.0	38.9	13	13	91.4
5	6904	53.8	74.5	29.0	38.7	48.4	19	17	93.2
	Central Area Winter Oat Experiment (12 Stations)								
1	7229	59.7	66.3	32.8	38.0	37.5	4/17	6/4	98.1
2	Arlington	57.8	61.7	29.4	45.4	35.7	25	5	96.7
3	7225	55.0	66.3	29.3	44.5	29.5	25	5	101.6
4	Vgrain.48-93	54.4	66.7	31.4	41.5	24.5	22	2	98.3
5	7218	53.7	66.0	32.8	37.8	39.5	20	2	103.8
	Southern Winter Oat Experiment (8 Stations)								
1	7134	41.3	100.0	29.2	41.0	5	4/19	5/20	106.0
2	7255	41.1	100.0	27.8	38.2	T	8	17	117.0
3	7218	41.0	100.0	33.7	39.5	15	13	18	114.0
4	7229	40.3	100.0	34.5	36.0	20	9	17	117.2
5	7258	38.6	100.0	29.7	40.0	10	19	20	108.5

B. SPRING SOWN NURSERIES GROWN EAST OF THE ROCKIES

Yield Rank	Variety or C.I. No.	Yield (Bu.)	Test wt. (Lbs.)	Plant ht. (Ins.)	Lodging percent	Date Head	Date Ripe
	Northeastern States Oat Experiment (9 Stations)						
1	7211	62.8	30.6	39.5	7.8	6/25	7/20
2	Ajax	61.5	29.7	38.9	13.0	22	16
3	Simcoe	60.2	29.6	39.3	12.5	22	18
4	Fundy	59.7	29.2	39.2	22.5	21	15
5	Craig	58.7	29.7	32.9	4.0	24	17
	North Central Oat Experiment (12 Stations)						
1	7234	85.9	33.1	41	34	6/18	7/23
2	7235	82.4	33.4	42	35	17	23
3	Minhafer	82.1	34.2	42	37	15	23
4	7084	82.1	31.2	41	53	17	24
5	7199	81.9	32.0	43	43	15	25
	Spring Sown Red Oat Experiment (14 Stations)						
1	6632	59.8	29.6	33.0	50.9	6/5	7/1
2	7278	58.3	30.8	33.5	43.3	1	6/29
3	7284	57.0	30.5	29.0	46.7	3	28
4	7154	55.8	29.7	35.1	45.0	6	7/2
5	Minhafer	55.4	31.3	35.1	21.8	6	3

C. SPRING SOWN EXPERIMENTS GROWN WEST OF THE ROCKIES

Yield Rank	Variety or C.I. No.	Yield (Bu.)	Test wt. (Lbs.)	Plant ht. (Ins.)	Lodging percent	Date Head	Date Ripe
	Northwestern Experiment (13 Irrigated Stations)						
1	Park	133.2	36.8	43.0	10.8	6/23	
2	Marne	127.9	35.5	45.7	8.8	23	
3	Cody	124.5	34.7	37.6	25.1	20	
4	Weibulls	123.3	37.8	47.1	31.9	24	
5	Sauk	122.9	37.3	43.9	10.0	19	
	Northwestern Experiment (12 Non-irrigated Stations)						
1	Weibulls	69.0	34.9	36.3	20.0	7/6	
2	Eagle	68.0	35.2	36.1	52.5	5	
3	7263	68.0	34.5	34.8	64.5	4	
4	Park	67.8	33.8	33.7	51.0	5	
5	Palomino	67.4	34.7	35.2	61.5	6/28	

In general, results obtained in 1957 from other experiments indicate no 1957 oat entry in any yield nursery is sufficiently crown rust resistant to serve as a parent for inducing resistance. However, from the data presented on other characters, it would appear that among more hardy winter oats Ballard C.I. 6980 exceeds all others in yield; whereas, C.I. 7132 is superior in test weight. None of the five very hardy top yielding entries have superior straw, and that character must be obtained elsewhere.

Among entries in the Central Area experiment, C.I. 7229 ranked first in yield and was equal to any in test weight; whereas Victor-grain 48-93 was superior in straw strength.

In the Southern Winter Oat Experiment, no oat was outstandingly superior in yield, but C.I. No.'s 7218 and 7229 were much the best for test weight and C.I. No.'s 7255 and 7134 were the best as to standing ability.

As a result, the above-mentioned would appear among the most promising for use as parents in making winter oat crosses.

Among spring oat entries in the Northeast Experiment, C.I. 7211 appears to be the best both in yield and test weight and it also ranks high in straw strength.

In the North Central region, C.I. No.'s 7234 and 7235 and especially Minhafer appear to have characters that make them of special interest as parents. None of these, however, can be considered outstanding as to straw strength.

Although four entries in the Spring Sown Red Oat Experiment exceed Minhafer in yield, none of these equalled that oat either in test weight or straw strength. Hence, Minhafer should apparently be the most valuable as a parent among entries in this experiment, although increased earliness, always important in the area, might be obtained from either C.I. No.'s 7284 or 7278.

In the area to the west of the mountains, Park ranks high in yield whether on irrigated or non-irrigated land. It is apparently not the best source for increased test weight, and for some reason its straw strength in 1957 on non-irrigated stations was relatively poor. Weibull's and Marne, regardless of the yield, test weight, and standing ability, both are, however, considered so susceptible to smut as to limit their usefulness as parents. As a result, Park, all things considered, may really be the best oat for use in crossing to produce oats for the area.

FOOTNOTES

1/ Principal Agronomist, Acting Head Oat Section, and Research Agronomist, Cereal Crops Research Branch, Crops Research Division, A.R.S., U.S.D.A., respectively.

2/Key to parents of C.I. numbers:

6632	Andrew x Landhafer
6717	Lee-Victoria x Fulwin
7084	Landhafer x (Mindo x Hajira-Joanette) x Andrew
7129	Wintok x Atlantic
7132	Traveler x (Red Rust x V-R) x (Fulwin x Wintok)
7134	(Trispernia x Clinton^2 - Santa Fe) x (Atlantic x Clinton^2 - Santa Fe)
7154	(Markton-Rainbow) x (D69-Bond)
7199	Landhafer x (Mindo x Hajira-Joanette) x Andrew
7211	Goldwin x (C.I. 4192: Victoria x Rainbow)
7218	(Victorgrain x Fulwood) x (Arlington-Delair x Trispernia: Coker's 53-29)
7225	(Lee-Victoria x Fulwin) x Bonda
7229	(Arlington-Delair x Trispernia) x (Bond-Fulghum x Victorgrain)
7234	Clintland 60: (Clintland^2 x (Clinton 57^7 x Landhafer) x (Clinton-B-C x R.L. 2105)
7235	Rodney x (Landhafer-Forvic)
7255	(Fla. 167 x Santa Fe-Clinton) x (Colo x Fultex) x (Fla.167 x Landhafer) x Canuck
7258	(Trispernia x Clinton^2 - Santa Fe) x (Atlantic x Clinton^2 - Santa Fe)
7278	(Bonda x Haj-Joan.) x Santa Fe x Kanota
7284	Osage x (Bonda x Haj-Joan.) x Santa Fe

3/The checks of forage readings were Lee in the Northern Winter and Appler in the Central and Southern Nurseries. Check equals 100 percent.

4/Number of stations shown indicates number reporting yields. Usually fewer reports were received on other characters.

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Physiologic Races of *Puccinia graminis* var. *avenae* in the United States in 1957*

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

From 405 collections made in 24 States, 511 isolates of oat stem rust were identified in the Cooperative Rust Laboratory at St. Paul, Minnesota. Race 7 (combined with 12), first in prevalence for the eighth consecutive year, decreased from 66 percent in 1956 to 58 percent in 1957. Subrace 7A comprised 6 percent of the isolates, an increase of 4 percent over 1956. Race 8 (combined with 10) increased from 15 percent in 1956 to 21 percent. Race 2 (combined with 5) made up 12 percent of the isolates, a decrease of 5 percent from 1956.

Subrace 7A, which can attack oat varieties with the so-called Canadian type of resistance at both low and high temperatures, increased in distribution from 6 States in 1956 to 10 in 1957, as follows: Iowa, Michigan, Minnesota, Mississippi, Missouri, North Dakota, Pennsylvania, South Dakota, Texas, and Virginia.

The potentially dangerous race 6 (combined with 13) increased from 1 percent in 1956 to 2 percent in 1957. It was identified 5 times from New York, 4 times from Pennsylvania, twice from Texas, and once each from Michigan and Wisconsin. Heretofore, race 6 and the closely related 13 have been found almost entirely in barberry areas in northeastern United States. It now appears that they are becoming established independently of barberry.

Subrace 5A, which can attack Saia, was found for the first time in 1955 adjacent to barberry at Blacksburg, Virginia, and was collected again in the same area in 1957.

A variant of race 13, provisionally designated 13A, was isolated from a collection made by Dr. Neal Jensen near Ithaca, New York. It is the most virulent culture now known in the United States and can attack the Richland (A) type of resistance, the Hajira or "Canadian type" (BC), and the White Tartar type (D). These oat genotypes represent all the sources of stem rust resistance in commercial varieties now grown in the United States.

Table 1. Physiologic races of oat stem rust in the United States in 1956 and 1957

Race	Percentage of isolates 1956	1957
2 and 5	17	12
6 and 13	1	2
7 and 12	66	58
7A	2	6
8 and 10	15	21

*paper presented at 1958 conference.

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Further Studies on the Yellow Dwarf Disease of Oats*

R. M. Endo

In 1957, 68 apparently resistant oat selections from the 1956 field tests were retested to four strains of the barley yellow-dwarf virus. One of the four strains was classed as mild, two strains as moderately virulent, and the fourth strain as highly virulent. Over half of the 68 oat selections proved to be fully susceptible to all four strains when infected in the 3 leaf stage. The highly virulent strain from California was very damaging to nearly all of the selections. At maturity, only 6 selections were rated as moderately susceptible (75 per cent reduction in kernel number) or slightly resistant (50% reduction in kernel number) to the California strain. These were: Albion (C.I. 792), Lemont x C.I. 4341 (C.I. 6718), and four selections of Avena strigosa. These same six selections, and an additional five selections also were rated as either moderately susceptible or slightly resistant to the New York strain and the California strain. The additional five selections were Burt (C.I. 2724), Fulghum (C.I. 1915), C.I. 4918, Iowa Winter 10 x Bond double cross (C.I. 4650) and Red Rustproof (C.I. 4664). Not all selections that are listed under the varietal names Burt, Fulghum, and Red Rustproof are resistant. Most of them are fully susceptible. It should be noted that of the 11 resistant selections, seven belong to the 21 chromosome oat group, and of the seven, four are either direct selections out of the old Red Rustproof oats, or they contain the Red Rustproof parentage.

Two encouraging factors can be discerned in this program. The first is that the four selections of A. strigosa, the variety Albion, and C.I. 4918 not only possess a moderate degree of resistance but also appear to possess a tendency to escape infection. In other words, under conditions of uniform and severe exposure to viruliferous aphids, these selections have usually shown fewer numbers of infected plants, whereas, plants of susceptible selections such as California Red or Clintland always develop 100 per cent infection. This tendency to escape infection, if substantiated in further tests, may prove to be useful under field conditions. The second encouraging factor is that highly virulent isolates of the barley yellow dwarf virus appear to be rather rare. A total of 134 isolates recovered from various grasses and cereals have been tested from 24 states. Only four of the isolates were classed as highly virulent. The first was recovered from blue grass plants from Wisconsin, and the remaining three isolates from diseased oat plants from Georgia, Minnesota and California. About 30 isolates were classed as moderately virulent and the remaining 100 isolates were classed as mild.

A total of 5246 F_1, F_2, and F_3 progeny of 58 crosses involving yellow dwarf resistant and susceptible parents were evaluated for their yellow-dwarf reaction in the field and greenhouse. The crosses were made by Dr. C. M. Brown. Very limited greenhouse data on the F_2 progeny of certain crosses suggest that resistance may in some cases be due to a single recessive gene. Progeny of crosses which included Albion (C.I. 792) or C.I. 4918 as one parent of the cross appeared to be the most resistant. The level of resistance appeared to be equal to that shown by the resistant parent. Both Albion and C.I. 4918 are very early in maturity and are poor agronomic types.

Temperature experiments were also conducted with the following schedule of day (10 hours) and night (14 hours) temperatures: 1) 70°F day and 65°F night, 2) 80°F day and 65°F night, and 3) 88°F day and 65°F night. With the highly virulent and the moderately virulent strains, susceptible oat and barley seedlings were killed at 70° and 65°F and 80°F and 65°F, but not at 88° and 65°F. Seedling plants infected with the highly virulent strain at 88° and 65°F developed moderate and restricted leaf symptoms, were stunted at maturity by 40 per cent and produced 40 to 50 per cent of the healthy checks. With the moderately virulent strain, the plants recovered rather slowly from the initial mild symptoms, were stunted at maturity by 25 per cent, and produced 60 to 75 per cent of the healthy checks. With the mild strain, seedling plants developed excellent leaf symptoms at 70° and 65°F. Very poor symptoms developed at 80° and 65°F, and 88° and 65°F. Symptoms developed only on the tips of the lower leaves and plants

*Paper presented at 1958 conference.

recovered rather rapidly and resumed near normal growth. Recovery was more rapid and complete at the higher set of temperatures.

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A New Tool for Oat Breeders[1]

Coit A. Suneson[2]

A nullisomic red oat with unique vigor has recently been reported (Agron. Jour., 1958). This has more than classical interest. Oats are normally difficult to hybridize. This nullisomic oat with low self-fertility and greater cross-fertility provides a practical way to get around this barrier. Hybrids can be detected without cytology, hence emasculation is not even necessary. In short, this character can be used essentially like a male sterile. Some very promising recombination-substitution complexes have been recovered. The most sensational results have come from crosses with Avena fatua. A complex bulk population for "evolutionary breeding" has also been produced.

1) Cooperative investigations of the Crops Research Division, Agricultural Research Service, United States Department of Agriculture, and the California Agricultural Experiment Station.

2) Agronomist's Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Davis, California.

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World Collection and Advanced Breeding Line Strains are Being Tested for Resistance to Crown Rust Race 264 and Other Races

D. J. Ward

The discovery of race 264 and similar races of crown rust that parasitize such sources of seedling resistance as Landhafer, Santa Fe, and Trispernia was reported a few years ago. Since that time the World Collection of Oats has been tested at Ames for seedling reaction to this race. No resistant hexaploid strains have been observed.

Race 264 occurred in epidemic proportions for the first time in 1957. Severe epiphytotics developed in Florida. This race was also detected at other places in the eastern part of the United States and Canada.

In recognition of the serious threat to the oat crop posed by race 264, World Collection of Oats strains and advanced hybrid lines submitted by state and federal oat research workers were planted in Florida and Puerto Rico in the fall of 1957 so that a further search for resistant germplasm can be made. More than

4800 entries from the active collection, 84 strains from the species collection, 160 lines constituting the International Rust Nursery, and approximately 1200 hybrid lines from sixteen oat improvement programs. The objective of these tests is to search for seedling or mature plant resistance to the Landhafer attacking races.

The Florida nursery is being grown at Quincy by Mr. W. H. Chapman. Local inoculum is being used to create a rust epidemic. It is expected that common races that attack Victoria and Bond derivatives will be present in the nursery in addition to the Landhafer attacking race 264 and similar races.

The Puerto Rico nursery is being grown by Dr. T. Theis in cooperation with Dr. H. C. Murphy. This nursery is being inoculated with a pure culture of race 264. The inoculum was increased at Ames, Iowa. This culture was originally isolated and identified from among the spores of a rust sample obtained from Florida.

Results of the Florida and Puerto Rico tests will be promptly circulated among oat research workers and resistant germplasm will be distributed as rapidly as possible.

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A Proposal for a Standard Lodging Test for Cereals

by N. F. Jensen, Cornell University

The accurate estimation of the strength of straw of a small grain variety is one of the most difficult kinds of information to obtain. It is also one of the least reliable since the infrequent obtaining of "good" lodging data is highly correlated with abnormal environmental stresses upon the plants at a single point stage in their growth. In recent years efforts have been made to identify strong-strawed varieties as an aid to plant breeders. What is needed further to insure continued progress in the development of stiff-strawed varieties is a standard lodging nursery to which a plant breeder annually could submit a few promising lines for a comprehensive evaluation of their absolute and relative straw strength. Perhaps a single location in the United States, or one location each in the United States and Canada, would be sufficient for each crop.

What would a standard lodging nursery be? Much is known, of course, as to what constitutes straw strength and what makes plants lodge. The role of height of plant, diameter and actual strength of straw, root structure, plant nutrition and other factors have been studied. Two things vital to the success of such a test would be: (1) Choice of location. Essential would be a rather stable environment and the availability of irrigation. Aberdeen, Idaho might be satisfactory for spring sown cereals. (2) A preliminary study of several variables in order to establish a standard testing procedure. Variables which suggest themselves as promising for study are: a) plant spacing. Increase in plant population per unit area favors lodging and vice versa; b) soil moisture. This is associated with root structure and anchoring ability; c) fertilizer. Increased fertilizer application, especially nitrogen, favors lodging. Time of measurements for straw strength, recognition of the effects of height differences, attention to measurements at critical periods such as standing ability at post-maturity (awaiting combine), and other related considerations would need to enter into a rating system. This preliminary study might be suitable for a graduate research problem. A standard lodging test in its final form might consist of two combinations of levels of variables found to have a discriminating function, e.g., spacing or rate of seeding and fertilizer.

This suggestion is being submitted to the oat, barley, and wheat newsletters in the hope that it may attract interest, discussion, and eventual action leading to the establishment of such a nursery. In increasing measure, progress in agriculture for the future will be associated with higher production per unit of area. The design of varieties compatible with improved farming practices and goals will require that greater attention be given to breeding for lodging resistance.

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CI Numbers Assigned During 1957
Reported by D. J. Ward (USDA)

Number	Designation	Source
7262	Binder, Sel. from P.I. 173231	Wash. (Holland)
7263	C.I. 4189 x Overland: 48Ab 6909	USDA, Idaho
7264	(Markton x Igold) x Minn. Sel. [(Bonda x H-J) x Santa Fe] X51FV	USDA, Idaho
7265	Torch: Nakota x Hajira-Joanette: C.A.N. 812	Saskatchewan
7266	Clintland x [X421-5-2: (Garry x Hawkeye-Victa.)]: X643-2	Wisconsin
7267	Clintland x[X421-5-2: (Garry x Hawkeye-Victa.)]: X643-6	"
7268	Nemaha x (Clinton x Boone-Cartier), Sel.436A2-2-4-5	Indiana
7269	Clintland x[X421-5-2:(Garry x Hawkeye-Victa.)]:X643-9	Wisconsin
7270	Beacon x Hawkeye-Victoria: X436-9	"
7271	[Land. x (Mindo x Hajira-Joanette)] x Andrew: II-50-136	Minnesota
7272	Columbia-Marion x [(Victoria x Haj.-Ban.) x (Victory x Haj.-Ajax)]: 04635	Missouri
7273	[(Bonda x Hajira-Joanette) x Santa Fe] x Mo.-0-205: X51JA, Sel. 2085	U. S. D. A.
7274	[(Hajira-Joanette x Bond-Rainbow) x Santa Fe] x (Andrew-Land., 3886): X51IL, Sel. 743	"
7275	Clarion x [(Bonda x Hajira-Joanette) x S.F.]: X51FW, Sel. 1845	"
7276	[(Bonda x Hajira-Joanette) x Santa Fe) x Marion: X51KG, Sel. 2239	"
7277	do Sel. 2252	
7278	[(Bonda x Hajira-Joanette) x Santa Fe] x Kanota: X51EX, Sel. 1669	"
7279	Nemaha x (Clinton x Boone-Cartier), Sel. 436A2-13-8	Indiana
7280	Avena strigosa	Unknown

Number	Designation	Source
7281	[(Victoria x Hajira-Banner) x (Victory-Haj. x Ajax)] x Mo. 0-205	Missouri
7282	do	"
7283	Osage x [(Bonda x H-J) x SF] : X51EW, Sel. 2069	U. S. D. A.
7284	do Sel. 2052	"
7285	[(H-J x B-R) x SF] x And.-Land., 3886: X51IL, Sel. 3189	"
7286	Arkwin Line 52	Arkansas
7287	Arkwin Line 60	"
7288	Fundy: Ajax x Abegweit, Sel. 4228-23	Ottawa
7289	(Victoria x Hajira-Joanette) x Ajax^2: R.L. 2153	Manitoba
7290	[Santa Fe x [(Victoria x Hajira-Joanette) x Ajax]] x Garry: Sel. 2278	"
7291	Vicar: Garry Selection: C.A.N. 827	"
7292	Indio: Sel. 5158	California
7293	[(Bonda x Hajira-Joanette) x Santa Fe] x Mo. 0-205: X51JA, Sel. 2067	U.S.D.A.
7294	(Arlington-Delair x Trisp.) x Woodgrain	South Carolina
7295	Crater: Fulghum x Custis: Sel. 38-3855	Oregon
7296	(Fulwin-Wintok) x [(Travl.- (RR-VR)]	Kentucky
7297	(RR x Vict.-Richland) x Lee	"
7298	(Fulwin-Wintok) x [(Travl. - (RR-VR)]	"
7299	Wintok x Stanton	"
7300	Dubois x New York Sel.	Massachusetts
7301	(H. Culberson x N. York Sel.) x Early Wintok	"
7302	Hairy Culberson x New York Sel.	"
7303	Dubois^7 x Landhafer	Indiana
7304	(Vgrain-Coker's 52-22)x[SF-Cl.x(Sac x H-J)] CI 6671	Georgia
7305	Do	"
7306	Do	"
7307	(Atlantic x Cl.^{2}-SF) x Imp Garry: X53ET	USDA
7308	(Wintok x Cl.^{2}-SF) x Imp Garry: X53DQ	"
7309	Do	"
7310	Arlington x (Wintok x Cl.^{2} - SF): X53EG	"
7311	Arlington x [(Bonda x H-J) x SF)]: X51MD	"
7312	Beacon x Laurel	Canada
7313	Dwarf Mutant	Iowa
7314	Do	"
7315	Espoir de Gembloux	Belgium
7316	Argentine 12	England
7317	Craigs Afterlea	Scotland
7318	Unnamed	"
7319	Unnamed	"
7320	Milford (S-225)	Wales
7321	Unnamed	"
7322	Silber	Germany
7323	New York sel. x Hairy Culberson: X51Z	USDA
7324	Hairy Culberson x New York sel.: X51AH	"
7325	Wintok x Hairy Culberson: X51AI	
7326	Do	"

Number	Designation	Source
7327	Hairy Culberson x New York sel.: X51AH	USDA
7328	Do	"
7329	(Anthony-Bond x Boone, CI 5218 x [Tennex x (Victoria x Hajira-Banner)]	Texas
7330	Forkedeer x [(Landhafer x (Mindo x Hajira-Joanette)]	Oklahoma
7331	Do	"
7332	(Hajira-Joanette) x [Atlantic x (Clinton^2-Santa Fe)]	Nebraska
7333	New Nortex x [(Bond-Rainbow x Hajira-Joanette) x Landhafer]	Texas
7334	Victorgrain 48-93 x [(Bond-Rainbow x Hajira-Joanette) x Landhafer]	Georgia
7335	Clinton^2-Ark. 674 x RL 2105: Purd. 5112A2-130-3-1P	Indiana
7336	(Cl. 59^4 - Land. x Ajax) x R.L. 2120: Pur. 5123A5-2-2P	"
7337	Cl. 59^6 - Land. x R.L. 2120: Pur. 5130A8-41-18P	"
7338	Victorgrain x [(Bond-Rain. x H-J) x Landhafer]	Georgia
7339	Do	"
7340	Do	"
7341	Do	"
7342	Suregrain x Minhafer: 7791	"
7343	[(Bonda x H-J) x SF)] x Kanota	"
7344	New Nortex x [B-R x H-J) x Landhafer]: 245-53-188	Texas
7345	Do 245-53-191	"
7346	Do 245-53-193	"
7347	Southland x Minn. 0-12-1	Florida
7348	(Suwan-Victgr. x Fla.167-Land)x[(Fulwin xL-V)x Tennex]	"
7349	(Letoria x Cl.^{2}-SF) x Arlington: X52A	USDA
7350	Do	"
7351	Wintok x Clinton^2 - Santa Fe	Oklahoma
7352	Forkedeer x [(Hajira-Joanette x Bond-Rainbow) x Santa Fe]	
7353	Forkedeer x [(Hajira-Joanette x Bond-Rainbow) x Santa Fe]	"
7354	Forkedeer x [Landhafer x (Mindo x H-J)]	"
7355	Do	"
7356	(Hajira-Joanette x Colo-Wintok) x Landhafer	Texas
7357	(Anthony-Bond x Boone) x [Tennex x (Victoria x Haj-Ban)]	"
7358	Alamo x [(Mindo x Hajira-Joanette) x Land.]	"
7359	Do	"
7360	Do	"
7361	Do	"
7362	New Nortex x [(Bond-Rainbow x Hajira-Joanette) x Landhafer]	"
7363	Do	"
7364	Do	"
7365	Do	"
7366	Do	"

Number	Designation	Source
7367	Do	Texas
7368	Do	"
7369	Do	"
7370	Do	"
7371	Do	"
7372	Vicland^2 x (Andrew x Landhafer)	Wisconsin
7373	Rodney x (Santa Fe x Clinton^3)	"
7374	(Garry x Hawkeye-Victoria) x (Santa Fe x Clinton^3)	"
7375	Clintland x (Garry x Hawkeye-Victoria)	"
7376	Do	"
7377	Do	"
7378	Do	"
7379	Do	"
7380	Selecta MC 41374	Argentina
7381	Avena Selecta	"
7382	1095A	Brazil
7383	Bage	"
7384	Unnamed	Argentina
7385	La Estanzuela	"
7386	Rodney Sel.	Manitoba
7387	Do	"
7388	Do	"
7389	Minhafer Sel.	Minnesota
7390	Do	"
7391	Bond Sel.	Iowa (Australia)
7392	Do	"

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IV. CONTRIBUTIONS FROM OTHER COUNTRIES

CANADA

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

In Ontario, the early spring provided excellent seeding conditions for oats with sufficient moisture for initial growth. Drought conditions in July and August hastened maturity and lowered the quality of grain to some extent. Yields however were reasonably good. Conditions in Quebec were rather dry in the spring but periods of excess moisture followed which caused both severe lodging and second growth in some areas. Unfavorable weather in September made harvesting difficult. In the Maritime Provinces, growing conditions were more or less normal.

Three new oat varieties were introduced in Eastern Canada in 1957, namely: Glen from Macdonald College, Que., Fundy from the Fredericton, N.B., Experimental Farm and Shield from the Central Farm at Ottawa and the Experimental Farm, Kapuskasing, Ont. All three varieties gave satisfactory results under field conditions.

Glen is early maturing, has good grain quality, high yield, moderate mature plant resistance to crown rust and the Ajax resistance to stem rust.

Fundy is a few days earlier maturing than Ajax, has the same resistance to the rusts and a more attractive kernel. It is well adapted in the Maritime Provinces and will likely spread into Quebec and Ontario.

Shield, already described in National Oat Newsletter, Vol. VII, was grown mostly in northern and eastern Ontario in 1957. On account of its earliness, this variety was quite well received by growers, particularly as a nurse crop.

Two new hybrid strains developed from the cross Garry x Mutica Ukraine x Abegweit^2 at Ottawa, were tested for the first time in the Eastern Canada Co-operative Test in 1957. Both did extremely well, outyielding Garry at 10 of the 13 tests. These strains are mid-season in maturity, have good resistance to the current races of crown and stem rust and have shown tolerance to *Septoria avenae* in Eastern Canada.

Septoria was again prevalent in Eastern Canada in 1957, particularly in eastern Quebec and the Maritime Provinces. *Septoria* was also more severe than usual in Manitoba. Apparently this disease may eventually become important to oat production in the Prairie Provinces. Conditions which favor the spread of this disease are not fully understood although dry hot weather appears to lessen the incidence of damage due to the black stem phase.

Damage from the rusts was not serious except in a few scattered areas. Heavy infections of crown rust were reported from central Ontario and the Gaspe area of Quebec. Reports of crown rust on Garry and Rodney were more prevalent than in previous years indicating an increase of races attacking these varieties. Crown rust races capable of attacking varieties having the Landhafer resistance were present in several localities in Ontario and Quebec. Isolates from the variety Clintland were identified as race 276.

Several moderately to highly fertile hexaploid progenies arising from crosses between the amphiploid of (*A. abyssinica* x *A. strigosa*) and *A. sativa* were obtained in 1957. These will be screened for possible resistance to *Septoria* under field and greenhouse conditions in 1958. Although progenies of crosses between the autotetraploid of *Avena strigosa* and *A. sativa* are being maintained the fertility is low. There is considerable variability in the chromosome number of the progenies. Some of the more fertile types having chromosome numbers approaching $2n = 42$ have been used in backcrosses to *A. sativa*.

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by G. J. Green and B. Peturson
Plant Pathology Section
Canada Department of Agriculture Research Laboratory
Winnipeg, Manitoba

Although the oat rusts did little damage in Canada in 1957, some interesting and important changes took place in the distribution of races of both stem rust and crown rust. Race 7 of stem rust was again the most common race but its prevalence decreased sharply from 60 per cent of the isolates in 1956 to 34 per cent in 1957. Race 8 continued to occupy second place in order of prevalence. The distribution of race 7A, which increased in prevalence from 3 per cent of the isolates in 1956 to 14 per cent in 1957, was much the same as last year. Nearly all the isolates came from Manitoba where Rodney is a popular variety. In Eastern Canada races 4, 6 and 13, as a group, increased in prevalence to nearly 25 per cent of the isolates. These races were not found in Western Canada and have occurred there rarely in the past.

Two new and important races of stem rust were discovered in Canada in 1957. They have been identified tentatively as races 8A and 13A. Both races can attack the varieties Garry and Rodney. Until they were found Garry was resistant to all races occurring in Canada and Rodney was susceptible only to the still uncommon race 7A. Evidently, races 8A and 13A, like 7A, possess a gene or genes conditioning virulence on varieties like Garry and Rodney which possess the BC genes for resistance. Rodney, presumably, has only the BC genes for stem rust resistance. Garry is resistant to race 7A because it possesses also the A gene for resistance but this type of resistance is ineffective against races 8 and 13. The two most likely origins for these races appear to be, firstly, the gene or genes for virulence to varieties possessing the BC genes for rust resistance may have been transferred from race 7A to races 8 and 13, and secondly, these genes for virulence may have arisen by mutation in these races.

An important change occurred in the distribution of crown rust races in 1957. Races 213, 216, 274 and 279, which were present in both Eastern and Western Canada, increased in prevalence from 3 per cent of the isolates in 1956 to 44.4 per cent in 1957. These four races are pathogenic on all the commercial oat varieties grown in Canada, including Rodney and Garry. Races 264, 293 and 294 were isolated in Canada for the first time in 1957.

Four of the crown rust races isolated have pathogenic properties of great interest to plant breeders. Race 264 can attack the varieties Santa Fe, Landhafer, Bond and Victoria, and races 276, 293 and 294 can attack all of these varieties except Victoria.

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V. CONTRIBUTIONS FROM THE U.S.D.A. AND STATES

ARIZONA

Oats in Arizona
By Arden D. Day (Tucson)

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

In 1957 Arizona farmers grew 25,000 acres of oats. Forty percent of the 1957 oat crop was harvested for grain and sixty percent was used for winter pasture, green chopped feed, and hay.

The 1957 production of oat grain in Arizona was 19,200,000 pounds, and the state average yield was 1,920 pounds per acre.

The principal varieties of oats grown in Arizona in 1957 were Palestine, California Red, and Markton for grain production, and Markton for winter pasture, green chopped feed, and hay.

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ARKANSAS

by H. R. Rosen (Fayetteville)

Perhaps the most significant event from a pathological viewpoint that occurred on oats in Arkansas in 1957 was the prevalence of races 213 and 216 of crown rust. While these races were first found in this state in 1949, (designated as race 101 with the older set of differentials), they did not become common until 1957. They have replaced almost completely races 202 and 203 which have been widespread since 1946 (then designated as race 45).

The economic importance of this shift can be visualized when it is noted that these newer races produce fully susceptible reactions on all oat varieties possessing either Bond or Victoria or both in their parentage, and that the acreage of such derivatives has increased considerably during the past decade in Arkansas as well as in the South as a whole. Such varieties as Victorgrain, Fulgrain, Arlington, Traveler, De Sota, Mustang, and Arkwin which have been and most of which are now among the most commonly used varieties, are all highly susceptible. The only group of oats that escaped infection in this state to any large extent in 1957 were the Red Rustproofs and even in these an occasional field was found in our survey in which the plants were as badly rusted as in fields of Victoria or Bond derivatives. The field resistance or escaping qualities of the Red Rustproofs to races 213 and 216 in Arkansas remains as enigmatic as when races 1, 7, 16, 202 and 203 were prevalent. Of course in the greenhouse in artificial inoculations they have been susceptible to all these races. What a problem for some bright young minds!

Fortunately while races 213 and 216 appeared early in 1957, some exceptionally cool or cold weather in April and early May held back the epidemic long enough so that yields of winter oats were not greatly affected by rust. However, spring planted oats of all susceptible varieties suffered seriously in yield and quality.

Far greater damage was caused by excessive rains resulting in flooded fields mostly in the delta and rice growing areas, and by a severe freeze on April 13 than by rust. In addition, Helminthosporium leaf blotch and anthracnose became very abundant in the later part of the oat growing season and more head blight or scab developed than has been observed in many years.

The Arkansas average grain yield of oats in 1957, 29 bushels per acre, does not take into consideration the rather numerous fields that were abandoned.

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GEORGIA

Report of Oat Work

by U. R. Gore (Experiment)

A large part of the oats grown in Georgia are grazed and then harvested for grain. A consierable acreage is sown with oats, ryegrass and crimson clover for grazing. Oats are more widely planted for temporary winter grazing than rye.

Testing of oats for soil borne virus (_Marmor_ _terrestre_ _var_. _typicum_ and _var_. _oculatum_) was continued at Experiment in 1957. The entries included the winter oat, winter hardiness, central area Southern oat and oat rust nurseries.

In addition, several hundred lines of breeding material were tested for Mr. Coffman, Morey, Chapman and others. The stem rust resistant lines in the oat rust nursery have generally been very susceptible. Bond-Rainbow x Hajira-Joanette in hybrid combination with Landhafer are very susceptible. Bond, Victoria and Rodney are quite susceptible. Saia is resistant and C.I. 7171 and 7172 show light infection. Hybrid lines showing very severe red leaf injury at Tifton in the Coastal Plain are heavily damaged by soil borne virus at Experiment and Clemson. The pedigrees of these lines are Victorgrain x (Bond-Rainbow x Hajira-Joanette x

Landhafer). This problem needs a lot of careful work before we release too many virus susceptible lines.

The rather spectacular increase of crown rust races 213 and 216 in 1957 caused severe damage to Victorgrain and Arlington oats. This resulted in low test weight and considerable lodging even in the Piedmont. Farmers who continue to plant oats after oats have lost stands from H. victoriae. Early planting for forage with infested seed of blight susceptible varieties result in almost complete kill of seedlings. The use of blight free seed with Ceresan or Panogen has greatly improved stands and forage yields on early plantings. A three year study comparing good and poor seed will be completed this year.

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By A. R. Brown (Athens)

Oat acreage harvested in 1957 dropped to 394,000 acres, however, the acreage used for grazing only, remained over 400,000 acres. The average yield per acre for the state dropped from 33 bushels in 1956 to 28 bushels in 1957. Some of the factors contributing to this reduction were: (1) mild temperatures coupled with ample rainfall caused a build-up of crown rust, leaf spot (H. avenae), oat blight (H. victoriae), septoria, and a malady commonly called "Yellow Leaf Mosaic"; (2) wet weather during harvest caused a high percentage of the oat crop to lodge. Test weights were unusually low due to the excess amount of diseases and rainfall. A high proportion of the grain was materially weathered.

The 1957-58 USDA Central Area Winter Oat Nursery was planted on October 19, 1957. All entries came up to a good stand except Fultex which had only 60 per cent stand. A low of 10°F on December 13, 1957 and continued cold during January caused considerable winterkilling among the more tender selections. Per cent winterkilling observed December 27, 1957 was as follows:

Appler - - - 10 per cent
Fultex - - - 20 per cent
CI 7306 - - 12 per cent
AB 110 - - - 65 per cent

A final reading on winterkilling will show damage on several other selections.

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

Grazing of oats started in early November and good grazing continued throughout December. However, growth of oats in January and early February (1958) has been at a standstill because of the coldest weather since 1940. Diseases have not been serious on oats but some early planted fields of Arlington and Victorgrain suffered some loss of stands from H. victoriae.

AB-110, a new oat variety, was increased on 10 acres at Sterling, Idaho, and distributed to Certified seed growers in south Georgia in 1957. AB-110 is an early forage oat developed by the Florida and Georgia Experiment Stations and the Crops Research Division of the U. S. Department of Agriculture. A selection of Minnesota 0-200-10: (Hajira-Joanette x Bond-Rainbow) x Santa Fe, obtained from Dr. H. K. Hayes was crossed with Southland in 1951. In 1954 a serious epidemic of crown and stem rust disclosed resistance in this cross to both diseases at Quincy, Florida, and Tifton, Georgia. A reslection by W. H. Chapman at the North Florida Experiment Station was increased at Aberdeen, Idaho, under the number AB-110. This selection has the early vigor and forage production of Southland plus added disease resistance from the Minnesota parent. AB-110 is not resistant to the new crown rust races 264 or 290, but is expected to replace Southland acreage for a few seasons until varieties resistant to the new races can be developed.

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IDAHO

by Harland Stevens and Frank C. Petr (Aberdeen)[1]

The yield of oats in southern Idaho was above average in 1957. There were no diseases observed or reported in the area.

Registered seed of Park was increased for release to growers in 1958. Head selections of Clinton x Overland[2], C.I. 5345, were made for the production of foundation seed. C.I. 5345 is a sister selection of Park that has resistance to Helminthosporium victoriae.

The highlight of the 1957 season at Aberdeen was the request by the University of Idaho and approval by the State Legislature of funds for a new cereal seed house and laboratory. Construction of this building was completed in late December.

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[1]Agronomists, Crops Research Division, Agricultural Research Service, United States Department of Agriculture.

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ILLINOIS

by C. M. Brown and R. M. Endo (Urbana)

An average yield of 38 bushels of oats per acre was produced in Illinois in 1957. This is 8 bushels lower than the crop of 1956 and 18 bushels lower than the record crop of 1955. These lower yields were due primarily to a severe invasion of crown rust. Late planting caused by an unusually wet spring in Central and Southern Illinois also caused some reduction in yield.

The acreage of oats harvested dropped from 3,041,000 in 1956 to 2,751,000 in 1957. However this figure does not include oats harvested for silage or oats not harvested at all because of late planting or severe attacks of crown rust. The acreage not harvested was especially high in Central and Southern Illinois where crown rust was very severe.

Clinton continued to occupy more acres than any other variety, however, its acreage dropped from 39 percent of the total in 1956 to 35 percent in 1957. Much of the Clinton acreage has been replaced by Clintland. Clinton will likely show an even greater decline in acreage in 1958 because of the severe damage caused by crown rust in 1957. Of the total acreage of oats planted in Illinois in 1957, Clinton accounted for 35 per cent, Nemaha 20 percent, Clintland 18 percent, Clarion 7 percent, Newton and Bonham 3 percent each, Bonda, Columbia and Mo. 0-205 2 percent each, and Branch 1 percent.

The new variety Minhafer has been recommended and approved for certification in Illinois. This rust resistant variety made a very good showing in all tests in Illinois in 1957. Clintland also made a very good showing in the Illinois tests. Clarion and Waubay, two varieties that have been very high yielding in past years, were damaged severely by crown rust in 1957. The Illinois variety, Logan, was also damaged severely in some of the tests. Garry, a late variety that has shown considerable promise in Northern Illinois, was apparently damaged by Race 216 of crown rust and as a result produced low yields of grain with very low test weight.

Oat Diseases

Crown rust was the only important oat disease in 1957 but it caused extensive damage to the Illinois winter and spring oat crop. Preliminary estimates place the loss between 30 and 40 million bushels. Late planting caused by early and frequent spring rains was considered an important factor indirectly contributing to loss since it permitted the rust a longer period of time to develop and inflict its damage on the crop. The weather was extremely favorable for crown rust development. An unusual aspect of the 1957 crown rust epiphytatic was the damage inflicted on the winter oat crop. Normally the winter oat crop matures early enough to escape rust. It was obvious that the crown rust epiphytatic was initiated on the winter oat crop in Southern Illinois, and that the rust spread rapidly northward on the spring oat crop. In addition to the very extensive damage occurring on Bond derivatives by races 202 and similar races, considerable damage also occurred on the Victoria-Richland derivatives such as Mo.-0205 and Branch by races 216.

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INDIANA

by J. F. Schafer, F. L. Patterson, R. M. Caldwell, L. E. Compton (Breeding, Pathology, Genetics), J. E. Newman, R. R. Mulvey, H. F. Hodges (Varietal Testing), and K. E. Beeson (Extension) -- (Purdue University)

The 1957 Season

The 1957 season was a very poor one for oat production in Indiana. Wet spring weather delayed planting, and continued wet weather combined with a severe crown rust epidemic reduced the state average oat yield to the lowest level in 10 years.

The Disease Situation

The 1957 disease situation can essentially be summed: Crown rust epidemic. Estimates of crop loss are presented elsewhere in this newsletter. Rust virulent on varieties possessing both Bond and Victoria resistances came into the state in quantity. There was also a non-damaging but widespread trace occurrence of Landhafer virulent races of the 290 group. Crown rust development occurred early enough in the season to be damaging on winter oats as well as on the spring crop.

Other diseases did not appear to be of major economic significance in 1957. Their effects were to a large extent obscurred by the severe crown rust epidemic.

1957 Indiana Oat Production

(Data obtained from the Purdue Dept. of Agricultural Statistics)

The harvested oat acreage dropped to slightly over 1 million acres in 1957 from a level of 1 1/4 million acres maintained for a number of years. This combined with the low yields reduced the oat production to the lowest volume since 1947, a year of severe Victoria blight. The current year's data was a contrast to the high average yields and production records of the previous 3 years. The acreage, yields, and production for the last 5 years are as follows:

	Acreage Harvested (000)	Acre Yield Bu/A	Production (000) Bu.
1953	1,181	36.5	43,106
1954	1,252	42.5	53,210
1955	1,302	51.0	66,402
1956	1,250	45.0	56,250
1957	1,062	34.0	36,108

Oat Varieties Grown in Indiana, 1957

In 1957 the Purdue Dept. of Agricultural Statistics began an annual varietal survey of the small grain crops. Farmers' yield estimates were obtained by variety as well as total varietal acreage.

	Per Cent of State Oat Acreage	Per Cent of State Ave. Yield
Clintland	44.9	105
Clinton 59	26.8	91
Newton	8.4	112
Bentland	4.9	101
Missouri 0-205	1.0	61
Dubois (Winter)	5.2	112
Other and Unknown	8.8	90

Oat Varieties Certified in Indiana, 1957

In 1957 a total of 10,839 acres of oats was inspected for certification by the Indiana Crop Improvement Association. The Newton variety, released in 1956, accounted for over half of this acreage. Putnam in its initial year of release was produced on 1500 acres.

	Foundation acres	Registered acres	Certified acres
Newton	63	1,158	4,950
Clintland	30	797	861
Putnam	80	1,419	12
Dubois (Winter)	55	308	389
Bentland		467	
Clinton 59	59	100	91

Oat Varieties Recommended in Indiana, 1958

Purdue Bulletin 658 includes the Experiment Station recommendation to farmers of oat varieties to be seeded in Indiana in 1958. Varieties recommended for northern Indiana are Clintland, Newton, and Bentland. Putnam is recommended for southern Indiana. It is proposed to add Minhafer, developed in Minnesota, to the recommended list as seed becomes available.

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IOWA*

by J. A. Browning, K. J. Frey, F. P. Gardner, H. C. Murphy,
K. Sadanaga, M. D. Simons, S. C. Wiggans and J. G. Wheat (Ames)

Transfer of crown rust resistance of C.D. 3820 into hexaploid oats

The diploid varieties C.D. 3820, C.I. 2630 and C.I. 3815 among others have gene(s) conferring resistance to virulent races of crown rust. The tetraploid C.I. 7232 derived from the cross between C.D. 4549 and C.D. 3820 carries gene(s) conferring resistance to crown rust present in the diploid parent, C.D. 3820. Hybrids between C.I. 7232 and the cultivated varieties Clinton and Burnett were backcrossed to Clintland and other varieties. Three among 11 BC_1 plants tested with race 276 of crown rust were found resistant. Just one seed was obtained through selfing of the BC_1 plants. By backcrossing to Clintland, Cherokee and other varieties, 53 BC_2 seeds were obtained. Eighteen BC_2 plants out of 41 which germinated were resistant to race 264 of crown rust. These are being crossed to Clintland and Burnett. Moderate self-fertility has been noted for some of the BC_2 plants. It is hoped that one to two more generations of backcrossing will result in the development of fertile hexaploid oats carrying the crown rust resistance of C.D. 3820.

*Ed. Note: Six other contributions from Iowa appear elsewhere in the newsletter.

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KANSAS

by E. G. Heyne, E. D. Hansing, James Wilson, C. O. Johnston (Manhattan)

Oat production in 1957 was the second largest in 10 years with 34 million bushels being produced from 1,121,000 acres with an average yield per acre of 30.5 bushels. Perhaps the most serious depressing effect was lodging due to wet weather after blooming. Crown rust was serious in local areas. In uniform nursery tests in eastern Kansas, Minhafer and a selection of Nemaha x Neosho-Landhafer gave the highest yield and test weight. These were the only two varieties that remained standing at harvest. They also were resistant to crown rust. A selection of Andrew x Landhafer 52347 was also outstanding for standing in 1957 at Manhattan and northeastern Kansas.

Robert Ellsworth, from Arizona, will work on the Cereal Breeding Project effective February 1, 1958. This will enable us to increase work on oat breeding problems.

Dr. James Wilson, from Texas, has replaced Dr. John Miller at the Fort Hays

Station. Dr. Miller has joined the staff at the Clemson Agricultural Experiment Station in South Carolina.

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KENTUCKY

V. C. Finkner and Randolph Richards (Lexington)

1957 Season

The growing season in Kentucky was characterized by a rather dry fall and extremely wet late spring. Yields were near the ten year average but quality was lower. Crown rust was very heavy which is unusual for this area. Winter killing was severe at Lexington but little was evident at most other locations.

U.S.D.A. Elite Oat Nursery For Hardiness

Seed of 276 entries supplied by David Ward were planted in the fall of 1956 at Lexington. 153 of these survived sufficiently to produce some seed. These 153 were planted for paired comparisons with seed again supplied by David Ward. Thus far we have had two periods of differential winter-killing this year. Observational data indicated that one year of natural selection isolated hardier types in 65 cases, no difference in 81 cases and in 7 cases the naturally selected plants appeared less hardy. In several cases the naturally selected plants showed little or no killing while the paired unselected plants killed completely.

Date X Rate X Variety Experiment

Dubois, Forkedeer, Atlantic and Bronco were planted at 1, 2, and 4 bu/A on Sept. 19, Oct. 3, Oct. 15 and Nov. 1 in 4 replications at Lexington. Significant differences in grain yield were obtained for date of sowing, rate of sowing, varieties, date X variety and date X rate. The only unexpected results were more killing and therefore less yield of the Sept. 19 planting (20 per cent killed, 34.2 Bu/A.) as compared to the Oct. 3 planting (6 per cent killed, 39.1 Bu/A.). Apparently the Sept. 19 planting had made too much growth and was caught in a more susceptible period by the cold weather than the Oct. 3 planting.

Small Grain Mixtures for Silage

Oats were grown in mixtures with wheat and barley at a planting rate of 2 Bu/A. Seed mixtures were prepared on an equal volume of each crop. The following results were obtained:

Mixtures	Expected	Expected	Observed D.M.	Expected % of silage mixture			Observed % of silage mixture		
	Yield(a)	Yield(b)	Yield gms	Wheat	Barley	Oats	Wheat	Barley	Oats
Todd	1915	1915	1915	100	0	0	100	0	0
Ky. 1	1318	1318	1318	0	100	0	0	100	0
Fulwin	1527	1527	1527	0	0	100	0	0	100
Todd+Fulwin	1721	1795	1703	55.6	0	44.4	69.2	0	30.8
Ky.1+Ful.	1422	1375	1503	0	46.3	53.7	0	72.7	27.3
Todd+Ky+ Fulwin	1585	1727	1726	40.2	27.7	32.1	62.7	20.5	16.8

Expected yield (a) was based on equal per cent of the mixture components multiplied by the components when planted alone. Expected yield (b) was based on the observed per cent of components in mixture multiplied by components when planted alone. The higher than expected yields of the mixtures is interesting especially since harvest could not be made at the optimum time for all components in the mixtures. The increased yield might be due to the mixture or to the planting rate. At least if a silage mixture is desired planting may as well be made as a mixture.

State Yield Trials

The spring oat test was seeded at Lexington on March 4. The yields of winter varieties, Dubois, Forkedeer, Atlantic, and Bronco, which were seeded in the test were very low, and these varieties are not considered satisfactory for spring seeding in Kentucky. The average yield for the experiment was 30 bushels per acre. Andrew and Missouri 0-205, the varieties which are recommended for Kentucky, had the respective yields of 45.8 and 32.0 bushels per acre. Over a period of seven years Andrew and Missouri 0-205 have averaged 46.9 and 46.3 bushels per acre respectively.

Winter oat variety tests were grown at four locations, Lexington, Princeton, Hopkinsville, and Murray. Thirty-six entries were tested in rod row trials at Lexington and Princeton. Twenty-five entries were tested in rod row trials at Hopkinsville and Murray. For the state as a whole, the recommended varieties, Bronco, Atlantic, Forkedeer, and Dubois were ranked as to yield as 1, 2, 13, and 15. Over a period of years Bronco has been the outstanding variety.

Ky. 53-368, C.I. 7132 has been very good in Kentucky trials as well as in the uniform Northern Winter Oat Nursery. It ranked third among the twenty-five entries in the 1957 Kentucky trials. An increase of the seed of this variety has been started.

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MAINE

by Clinton R. Blackmon (Orono)

Oats were planted relatively early in Maine but emergence was slow because of the dry soil. Average yield for the state was 52 bushels per acre, slightly below the 57 bushels in 1956.

The average yield per acre of important varieties of oats in trials at Orono and Presque Isle for the four years 1954-57 were as follows: Improved Garry, 71.8 bu.; Ajax, 69.1 bu.; Craig, 67.7 bu.; Simcoe, 64.8 bu.; Rodney, 64.2 bu.; Mohawk, 61.3 bu.; Clinton "59", 55.4 bu.; Clarion, 55.2 bu.

The World Oat Collection is being screened for potential high yielding varieties to be used in the oat breeding program. Several selections of the cross Clinton 59 x Beaver are in advanced tests. These combine disease resistance with high yield.

Several oat diseases are currently causing trouble in the state. Red-leaf virus infection occurred in all sections of the state. Early planted grain was affected more than later seedings. Leaf spot (Helminthosporium avenae) was widespread and occurred on all varieties. Stem rust appeared late in the season and severely infected Clinton 59 oats in a small area of Central Aroostook County.

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MASSACHUSETTS

Winter vs. Spring Oats
by I. K. Bespalow (Eastern States)

The data below indicate relative performance of winter and spring varieties in a season favorable for winter oats and highly unfavorable for spring oats. Characteristics for the seven best varieties in each of the uniform winter and spring oat nurseries are tabulated. Stands were comparable because of virtually complete winter survival of the winter oat varieties listed. Note that not only yield, but also kernel characteristics highly favor the production from the winter oats.

Comparative Yield and Quality of Grain of Winter and Spring Oats Grown at Feeding Hills, Massachusetts, in 1957.

	Yield Bu/Acre	Test Wgt. Pounds/Bu.	Wt. 1000 Kernels in Grams	Percent Groat
Winter Oats				
1. Le Conte	79.3	36.5	31.0	75.8
2. Lee	74.4	35.5	24.0	77.6
3. Coy	72.2	32.5	25.2	74.5
4. Dubois	70.1	34.0	27.0	76.1
5. Cimarron	67.6	33.5	28.6	77.0
6. Bronco	62.8	35.0	26.7	74.0
7. Wintok	61.9	35.0	24.8	79.0
Average	69.8	34.6	26.8	76.3
Spring Oats				
1. Mo. 0-205	40.7	26.0	19.2	67.8
2. Clinton 59	36.4	26.0	22.0	68.2
3. Clarion	36.1	25.5	23.1	64.8
4. Burnett	35.5	25.5	27.0	65.0
5. Ajax	23.2	20.5	22.8	61.6
6. Craig	19.6	20.0	31.3	67.0
7. Garry	17.6	17.0	27.6	60.1
Average	29.9	22.9	24.7	64.9
Characteristic of Ave. relative to winter oats which is taken as 100	43.0	66.2	92.2	85.0

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MICHIGAN

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

The 1957 Season

Two unusual things characterized the 1957 growing season in relation to the oat crop in Michigan. A heavy epidemic of leaf rust occurred in central Michigan in advance of the appearance of leaf rust in the southern part of the state and unusually heavy rainfall in July in central Michigan caused considerable lodging.

The early occurrence of leaf rust with its subsequent spread at an early date to Tuscola county in the "Thumb" is just the reverse of the expected pattern.

Leaf rust will usually become prevalent in the southern tier of counties first and then spreads northward, arriving in the "Thumb" too late to cause much damage. The leaf rust pattern in 1957 was undoubtedly the result of a freakish shower of spores carried by wind currents from regions to the south of Michigan. Stem rust and Septoria were present but were not important when contrasted to the effects of leaf rust in 1957.

Disease Resistance Studies

Crosses to obtain *Septoria* resistance are now in F_4. Preliminary screening for lodging resistance, rust resistance and *Septoria* resistance is being completed this winter.

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MINNESOTA

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

Since the isolation of the lines (i.e. selections from IMHJA crosses) with a combination of major genes for stem and crown rust resistance, a group of varieties with diverse genetic backgrounds including Ajax, Sauk, Clintland, Rodney, Garry, and many others, have been crossed with these lines in the past five years in attempts to combine disease resistance with good agronomic qualities. With the aid of winter increase in Mexico through these years, it was possible to conduct yield tests for some of the material in four years after the original crosses were made. For instance, some 60 F_6 bulk lines from ten crosses were tested in rod rows in 1956 and 40 were selected and retested in 1957. Based on their yield and other agronomic performances, about 20 lines are considered promising. Along with the bulk line yield trials in the past two years, a number of sub-lines for each of these promising bulk lines were established and yield tests for these sub-lines will be conducted in 1958.

In addition, a great number of lines in different generations from the same crosses appeared promising and will be either entered in the yield tests or observed further in the agronomy and disease nurseries.

A number of plant selections in F_2, F_3, and F_4 were made from the crosses of (LMHJA x Clinton) x Rodney and (LMHJA x Andrew) x Rodney and also in the crosses of LMHJA with Garry, Burnett, and several others. Over-winter increase is being made on some of the selections which have shown an improved straw strength and grain quality.

Advanced breeding material from the crosses made prior to 1953 has been tested in the state or in the region for one to several years. Some selections are considered promising for their high yield and disease resistance. One selection, i.e. [Landhafer x (Mindo x HJ)] x Clinton II-50-12, (C.I. 6935) has continuously performed well in yield in Minnesota. Over a period of two years it was found from data compiled at eight locations that this selection yielded only second to Garry, but it matured two days earlier than Garry and five days earlier than Rodney. Its straw strength on an average, is about equal to that of Sauk and Rodney but better than Ajax and Branch. However, this selection has lower bushel weight than most of the recommended varieties. II-50-12 is resistant to all prevalent races of crown rust, and all races of stem rust except 7A, and smuts. The seed of this selection has been increased up to 52 bushels and further increase is being made over-winter in Arizona.

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MISSISSIPPI

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

Excessive rains during 1957 caused unmeasurable damage to the state's oat crop. Many fields were abandoned. Yields were greatly reduced on fields which were harvested with the resulting seed quality very poor.

Fall planting was hampered too by wet fields. Only a fraction of the intended acreage of winter oats was planted and most of this was seeded late. Pastures for winter grazing are few in number and lacking in forage. Unusually low temperatures have retarded the normal growth of winter oats limiting their value for both winter grazing and prospects of a good grain crop for 1958.

Only four of fourteen oat nurseries were harvested. The data were very erratic and highly unreliable. Lodging, the result of the heavy rains, laid waste to most of the nursery.

A severe epidemic of crown rust primarily of Victoria virulent races occurred early in the nursery. Promising selections of oats with Victoria parentage which have been carried for a number of years were badly rusted. Landhafer virulent races, however, were apparently absent from the nursery.

Delayed planting of the 1958 oat nursery has retarded germination and vigor of all the plots. Plots planted with the limited seed stocks harvested during 1957 have largely failed.

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MISSOURI

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

The 1957 Missouri oat crop averaged 31 bushels per acre, the same as in 1956, but 10 bushels below the 1955 state average. Yields in south Missouri were injured from late planting and heavy crown rust. In north Missouri some injury resulted from crown rust, especially to test weights. Stem rust came in late and only in scattered amounts.

Race 216 was present in quantity and apparently attack Mo. 0-205, since crown rust was heavier on this variety than had been observed in previous years. No resistant type pustules were found on any of the Landhafer varieties.

Preliminary increase will be made in 1958 of Mo. 4346, Columbia x Marion (C.I. 6625). This strain is similar to Mo. 0-205 in yield and lodging resistance. It has been superior to Mo. 0-205 in test-weight and has a light colored Kernel. With the new races of crown rust present in 1957, it was superior to 0-205 in rust resistance.

Selections from hardy x hardy winter oat crosses were increased in 1957. Many appear to be as good as Wintok in hardiness. These are being tested on the Pierce City field in southwest Missouri as well as at Columbia.

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NEBRASKA

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

After having harvested one of its poorest oat crops of record in 1956, Nebraska in 1957 harvested one of its best crops with the yield per acre one of the highest ever attained since 1872. The crop was uniformly good with yields somewhat depressed in the northeastern part of the state due to early season moisture deficiencies.

Crown rust damage was spotted throughout eastern Nebraska with yield reductions in some areas of up to 30 percent. Other oat diseases were not a factor in oat production this year. Varieties with Landhafer or Santa Fe resistance maintained their resistance throughout the season while Burnett, Mo. 0-205, and Garry rusted heavily indicating that much of the crown rust inoculum contained race 216. As would be expected, yield levels were differentiated sharply by the level of crown rust resistance contained.

Clintland was the best variety in eastern Nebraska, but on a state-wide basis it was Mo. 0-205 followed very closely by C. I. 7194, Cherokee Reselection.

On the basis of their records Minhafer is being recommended for production in eastern Nebraska and Garry for irrigated areas in western Nebraska in 1958. C. I. 7194, Cherokee Reselection, will be further increased in anticipation of release in 1959 or 1960.

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NEW HAMPSHIRE

by Leroy J. Higgins (Durham)

The 1957 Uniform Northeastern Oat Trials were grown on good Agawam fine sandy loam. Since the plots were less than 100 feet from the river bank, the whole soil profile was well-supplied with moisture even during the extended drought.

The 1957 climatic data for the Dover-Durham vicinity follows:

Rainfall in Inches

	April	May	June	July	4 months Total	Average per month
1957	1.78	2.68	1.55	2.87	8.88	2.22
Mean (over 50 years)	3.57	2.87	3.47	3.37	13.28	3.32

Temperatures in F. Degrees

	April	May	June	July	4 months Total	Average per month
1957	48.2	58.1	67.9	70.0	245.1	61.4
Mean (over 50 years)	43.8	54.7	63.6	69.5	231.6	57.9

Sincere New Hampshire grows more oats for pasture and annual hay and also as nurse-companion crops than are grown for grain, forage yields are important. The forage weights have been obtained by weighing each bundle of oats before heading and threshing.

The 1957 average yields for the thirty varieties, replicated three times, were much higher than in past years 4.16 tons per acre for forage and 72.5 bushels per acre for grain. The disease count and the amount of lodging were comparatively low.

The leading grain yields were as follows: CI 7211, Goldwin X (CI 4192: Vict.-Rain.) 95.9 bu.; CI 4157, Ajax 89.3 bu.; CI 6767, Simcoe 87.1 bu.; CI 560

Victory 84.7 bu.; CI 6661, Rodney 83.5 bu.; CI 6662, Garry 82.5 bu.

The leading forage yields were CI 7211, Goldwin X (CI 4192: Vict.-Rain.) 6.0 T.; CI 560, Victory 5.7 T.; CI 4157, Ajax 5.0 T.; CI 6661, Rodney 4.8 T.; CI 6662, Garry 4.7 T.; CI 6767, Simcoe 4.5 T.

Out in the State, Ajax, Clarion, and Clinton varieties were replaced by the newer Garry where seed was available during the past season. Yields were reported as being very satisfactory.

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NEW YORK

By N. F. Jensen, E. J. Kinbacher, A. A. Johnson, G. H. Willis, K. R. Jones, W. S. Young (Plant Breeding); G. C. Kent, W. F. Rochow, R. S. Dickey, G. F. Gregory (Plant Pathology); R. B. Musgrave (Agronomy) - (Ithaca)

In 1957 harvested acres of oats in New York totaled 668,000 acres with an estimated production of 35,404,000 bushels. Yield per acre was estimated at 53 bushels per acre, the highest state average yet obtained. The principal variety grown was Garry. Other varieties were Rodney, Mohawk and Clinton.

An important step for the oat improvement project was taken in 1957. Field inoculations of stem and crown rust races were made on susceptible rust spreader rows throughout the nurseries. In addition to the value of having information on the reaction of strains to known races this procedure showed itself to be an important aid in the selection process. The use of Race 7 of stem rust, for example, enabled us to make a 10 per cent discard of susceptible strains, this desite the fact that these strains have been grown in areas where Race 7 has been collected in past years. It is planned to expose oat strains to different important stem and crown rust races in successive years. It is hoped that this procedure can be supplemented in the future with greenhouse studies with the important but not generally prevalent races.

The variety Pendek from Holland is an attractive, short-strawed, high-yielding variety which has attracted our attention as good parental material for hybridization.

Cornell Strain 618a1-4-6, C.I.7211, from the cross Goldwin x C.I. 4192 (Victoria x Rainbow), has been singled out for special attention in 1958. The performance record of this variety can be found in the USDA 1957 summaries of the Northeastern Uniform Spring Oat Nurseries.

A note on straw stiffness: One of the sorts which has shown an exceptionally stiff straw is C.I. 4893. Apparently this is the same oat as the Sturdy variety. Sturdy has an extremely compact "cluster" type panicle mounted on stiff, semi-dwarf culms. The rigidity of these culms is remarkable. However, we have used Sturdy in a series of hybrids over the past 7 years and have not been able to recover a single individual which is satisfactory either in quality of kernel or in yield. We have some apparent improvements, particularly in the addition of factors for disease resistance, and there are also some intermediate type panicles on intermediate length and strength straw. We have not been able to transfer a normal open type panicle to this very desirable straw type. A new series of crosses and backcrosses is annually made to the improved lines in the hope that the right combination is possible and may appear with continued effort. It is possible that this relationship may hold for all of the stiff-strawed oats of the Sturdy type and that it may be a difficult breeding job to put a normal type panicle producing good quality kernels on the semi-dwarf straw types.

A new strain of stem rust, identified as 13A, was collected on the Experiment Station at Ithaca in 1957.

Field and laboratory tests with winter oats are being continued with much interest. Two strains, 5032aB-2B-35 and 5045aB-2B-14, have shown good hardiness and yield characteristics. Both are in the 1958 USDA Northern Winter Oat Yield Nurseries. Kieth Jones is working on phases of winter oat breeding for his doctoral research. His presence has made it possible to increase the number of hybrid seeds obtained for our crossing program.

A note on grain quality: The Quaker Oats dehulling machine was used to obtain groat percentages on several hundred strains in one 1957 nursery. At the conclusion of the runs it was decided advisable to examine the grain samples of oats with extremely low and extremely high groat percentages. For the low groat percent group the figure of 70 per cent groat was established as the upper limit. There were 13 oats in this group. For the high percent group the figure of 78 per cent was established as the lower limit. There were also 13 oats in this class. The percent hulless kernels in a fresh sample was obtained for each oat. Following this, a new 25-gram sample composed of fully hulled kernels was picked from each oat and this sample dehulled in the machine. The results obtained follow:

	Unadjusted sample	Percent hulless		Fully hulled sample
	Range - percent	Range	Average	Range
Low Groat Group:	66.8 - 70.0	2.4-16.7	7.0	66.0 - 70.4
High Groat group:	78.0 - 84.0	18.0-46.8	28.0	71.6 - 76.4

It can be seen that the original high groat percentage oats did, indeed, have a much higher percent of hulless grains and that the removal of these and substitution of a fully-hulled sample gave a more realistic and truer picture of the percent hull. We concluded from this examination that 1) dehulling data obtained from unadjusted samples will not lead to a misclassification of an oat if it is in the low groat group, but may if it is in the high groat group, as is shown by the reading of 71.6 in the adjusted sample. This would certainly be considered a low groat percentage in the total range of 66.8 - 84.0 per cent. Note, however, that the ranges obtained from the adjusted samples for the 2 groups do not overlap. 2) If the purpose of the information is to permit the selection of a thin-hulled oat, as in breeding for this characteristic, then the determinations must, by all means, be made on adjusted fully-hulled samples. It is, of course, important to know whether a high groat percentage as obtained on an unadjusted sample represents a fully-hulled and thin-hulled oat or simply an oat which shells easily in threshing.

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OHIO

Oat Breeding and Testing

Dale A. Ray (Columbus)

1957 Season in Ohio

The 1957 season was marred by extensive areas in which oat planting was delayed or in which replanting was necessary following excessive early spring moisture. Other areas escaped the water damage and reported excellent yields. Crown rust appeared early in the season and produced moderately heavy infection on susceptible Victoria derived varieties throughout the western and central sections of Ohio. Landhafer-parentage varieties and selections showed light infection with crown rust in the areas just mentioned by the mature-plant stage. Red leaf and stem rust were present but caused little loss.

Approximately 1 1/8 million acres seeded to oats in Ohio for 1957 is consistent with the average for the preceding ten years. The average yield per acre was slightly below average and the bushel weights were generally reduced by the weather conditions.

Certification program

Acreages inspected for 1957 certification in Ohio included:

Variety	Acres Inspected	Percent	
Clintland	9436	74.5	
Clinton 59	1837	14.5	
Clarion	437	3.5)	
Andrew	199	1.6)	
Newton	237	1.9)	11.1
Garry	198	1.6)	
Ajax	186	1.5)	
Craig	51	.4)	
Rodney	48	.4)	
Bentland	17	.1)	
Mo. 0-205	16	.1)	
	12,662		

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Varietal recommendations

Clintland, Clinton 59, Clarion and Rodney varieties are recommended in all areas of Ohio. Ajax and Andrew are considered acceptable for the northern half of the state.

Dubois winter oats is considered acceptable for southern Ohio.

Variety and selection testing programs

Replicated farm drill-sown variety tests were conducted at four outlying experimental farms, the experiment station farm, and the University farm. Data from these tests serve as a basis for varietal recommendation when summarized for three or more years. Uniform oat winterhardiness, North Central region spring oat, and spring-sown red oat nurseries were grown in Ohio at one or more locations. Preliminary and advanced selection rod-row tests were conducted at Wooster and Columbus. No recent Ohio selections appear superior to the recommended varieties at this time.

OKLAHOMA

B.C. Curtis, A.M. Schlehuber, R.M. Oswalt, E.L. Smith and H.C. Young (Stillwater)

Production

A total of 14,620,000 bushels of oats were produced on 731,000 harvested acres in 1957. The average yield of 20 bushels was slightly higher than the 10 year (1946-1955) average. This average, although low, was quite good considering the adverse weather conditions and diseases that beset the crop in 1957. The major adverse weather factors were excessive rainfall (more than double the 1956 total), hail and high winds. Crown and stem rust and septoria developed in heavy proportions in most areas.

Forage Studies

Ten oat varieties representing, in general, tall leafy types were seeded in replicated plots for evaluation of forage and hay and/or silage yield. The results of this test are as follows:

Variety	C.I. No.	Date headed	Date harv.	Yield green wt.	Yield dry wt.	Percent dry matter
			May	pounds per acre		
Bronco	6571	5-13	29	32,628	7,992	24.5
Arlington	4657	5-7	24	29,607	7,478	25.4
Forkedeer	3170	5-9	24	29,394	7,346	25.2
Cimarron	5106	4-29	20	27,820	6,679	24.0
Atlantic	4599	5-6	27	27,012	8,087	30.1
Stanton Str. 1 Sel.	6902	5-3	24	26,502	7,015	26.5
Colo X Wintok	5118	5-9	27	24,715	7,707	31.3
Arkwin	5850	5-9	29	23,056	7,469	32.4
Average		5-7	26	27,592	7,472	

The above results include only 8 varieties. Two other varieties C.I. 5364 and Winter Turf could not be harvested because of excess lodging. Bronco shows good promise as a hay or silage type. The above test is being continued.

Crown Rust Races

In order to determine the local oat crown rust race population, 202 collections were obtained in 1957 from approximately 8 winter oat and a few spring oat varieties grown in Agronomy Department State-wide Variety Test Nurseries at 40 different locations in Oklahoma. Not all varieties were collected at each station. The study is not yet complete, but as this is written there have been 116 isolates obtained consisting of 11 races. The number of isolates of each race is as follows:

Race	No. isolates	Race	No. isolates
201	14	216	32
202	5	217	1
203	1	237	1
209	1	274	57
210	1	279	1
213	2		

None of these races are capable of attacking Landhafer. Races 216 and 274 both attack Victoria. Collections from the variety Landhafer at Stillwater where it was rusted slightly, have not yet been processed. So far, 47 collections failed to yield viable urediospores. These were principally from the varieties Bronco and Mustang.

Oklahoma State-wide Winter Oat Tests - 1957

Yield and test weight data are shown below from tests conducted in 11 counties in Western Oklahoma and 4 counties in Eastern Oklahoma in 1957. These counties represent the major winter oat growing areas of the state. Each variety is compared with Forkedeer for the same tests in each area.

Mustang and Arkwin were grown in only the southern part of western Oklahoma and C.I. 6902 was grown in only the western area because of their lack of winter-hardiness. C.I. 6988 and C.I. 7128 were grown in only the western area because of their susceptibility to the leaf disease that usually attacks Cimarron in the eastern part of the state.

C. I. No.	Types and Varieties	No. of Tests	Yield Per/A.	Weight	Percent of Forkedeer Yield	Percent of Forkedeer Test Weight
	Western Oklahoma - 11 Counties					
	Fulwin Derivaties					
4660	Mustang	6	67.3	30.7	103	95
6571	Bronco	11	63.6	27.3	104	91
	Winter Fulghum Sel.					
3169	Tennex	11	63.4	28.6	104	96
3170	Forkedeer	11	61.1	29.9	100	100
	Hardy Winter Types					
3424	Wintok	11	55.8	30.7	91	103
5106	Cimarron	11	68.3	29.3	112	98
	Miscellaneous Winter Types					
5850	Arkwin	6	61.5	32.6	94	101
6988	Cimarron X Traveler	8	57.7	26.4	91	92
7128	Cimarron X Traveler	8	55.6	26.8	88	93

			Eastern Oklahoma - 4 counties			
	Fulwin Derivaties					
4660	Mustang	4	52.5	27.0	106	98
6571	Bronco	4	43.3	25.8	88	94
	Winter Fulghum Sel.					
3169	Tennex	4	47.6	25.3	96	92
3170	Forkedeer	4	49.4	27.5	100	100
	Hardy Winter Types					
3424	Wintok	4	38.1	27.2	77	99
5106	Cimarron	4	53.2	27.0	108	98
	Miscellaneous Winter Types					
5850	Arkwin	4	49.1	29.2	99	106
6902	Stanton Sel.	4	49.3	27.6	100	100

The average yields for all varieties, by location, ranged from 39.6 bushels per acre to 72.8 bushels in western Oklahoma and from 43.5 to 47.8 bushels in the eastern area. The average weight per bushel, by location, ranged from 22.9 to 33.1 pounds in the western area and from 24.6 to 29.2 pounds in the eastern area of the state.

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PENNSYLVANIA

by Clarence Bryner, Assoc. Extension Agronomist; Beckford Coon, Entomologist; Robert Pfeifer, Assoc. Agronomist; Elmer Pifer, Assoc. Extension Agronomist; and Richard Schein, Asst. Pathologist (State College)

Oat Production in Pennsylvania
by Elmer Pifer

An average yield of 39 bushels of oats per acre was produced in Pennsylvania in 1957. This is 4 bushels lower than the record yield of 1954 but is 2 bushels higher than the 1947-56 average yield. The oat acreage in 1957 was 776,000 acres, which is approximately 15,000 acres higher than that reported in 1956. Clinton occupied more acres than any other variety. Other varieties grown include Garry, Craig, Ajax, Rodney, Clintland and Clarion.

The major portion of the winter oat production is confined to the southeastern counties of the state. Winter oats includes about 7 percent of the total, or an estimated 56,000 acres. This crop has increased in ten years from an estimated acreage of only 3,000 acres in 1947.

Oat Certification Program in Pennsylvania
by Clarence Bryner

Pennsylvania Spring Oat Certification in 1957 as certified by the Bureau of Plant Industry, Pennsylvania Department of Agriculture:

	Registered	Certified
Clinton 59	91	428
Garry	44	267
Craig	0	22
Ajax	12	22
	147	739

Ajax was chopped from the recommended list in 1958 - Craig will be chopped in 1959.

Pennsylvania Winter Oats:

	Registered	Certified
DuBois	22	159
LeConte	14	82
	36	241

Foundation seed of hybrid corn and small grains are produced by the Pennsylvania Foundation Seed Cooperative.

Entomological Studies
by Beck Coon

Research emphasis is being placed on the aphid vectors of Barley Yellow Dwarf Virus, both in field and greenhouse studies. The important vectors in Pennsylvania are: English grain aphid (Macrosiphum granarium), Apple-grain aphid (Rhopalosiphum fitchii), and the Corn leaf aphid (Rhopalosiphum maidis).

Greenhouse studies center primarily around screening the world oat collection for aphid resistance and studies on the biology of the species.

Flight habits of BYDV vectors will be investigated during the 1958 season using different types of aphid traps in the field. Variety resistance in the field to the aphid vectors will be studied. A survey of insects collected on small grains is in progress.

Pennsylvania Oat Disease Work
by Richard Schein

We have been primarily concerned with two diseases: red-leaf and crown rust. In the past season, infection by the barley yelow dwarf virus was widespread in the state, particularly in areas where yellowing of winter barley had been observed during the previous fall. It would appear that warm fall weather, allowing build-up of the vector and considerable spread among plantings of winter barley sets the stage for infection of spring oats the following spring. The pathologist, entomologist, and breeder are cooperating on combatting this disease.

Crown rust has not been too important with us the last few years except in the northern tier of counties where the crop is latest. The change in the United States racial picture in the last year and the isolation of a new race in New York are indications that we must keep a close eye on these developments in Pennsylvania. We are growing the USDA rust nurseries in an effort to keep abreast of any changes in our racial population.

Our program on oat diseases is quite new and we are still in the disease survey state in much of our research. Because of the importance of oats to the Pennsylvania dairy industry and the need for almost doubling production within the state, it is felt that this program will develop rapidly.

Oat Breeding Program
Robert P. Pfeifer

The Oat breeding program has undergone changes both in personnel and scope. Mr. F. A. Coffman of the U. S. D. A. has cooperated closely and spent several weeks in Pennsylvania planting, harvesting, and note taking this year. He has supervised a sizable winter oat breeding project in Pennsylvania this year. His plots are located at Clearfield, University Park, and Landisville, Pennsylvania. Progress in winter-hardiness of winter oats is being made through this effort.

The Pennsylvania station personnel are actively engaged in both a spring and winter oat testing and breeding program. Many selections were made from head rowed material from bulked selections this year. Yield data will be available on this material next season.

An experiment concerning straw mulching of winter oats gave striking differences. Mulching at the rate of 2 tons of straw per acre caused almost complete winter kill of all varieties tested. No straw mulching permitted the survival of all varieties. Some winter kill was observed in the less hardy varieties that were not mulched.

The oat station varietal testing program has been increased. Seven locations for testing winter oats were sown.

Mr. Phillip Kline completed a study on winter kill in oats. He found that October plantings predisposed all winter oat varieties studied to winter kill. Earlier plantings survived in proportion to their known winterhardiness. Severe killing was not observed until the month of February and continued through the month of March. Time of winter killing was determined by exuming flats from the field in which the plants were planted the previous fall.

Mr. James Justin completed a study involving the yield factors of Ajax, Clinton 59, and Craig Oats as influenced by N, P, K fertility. He found that in the Hagerstown soil used, yield was increased markedly when the nutrients N and P were applied together. The principal effect was to increase seed numbers by increasing the number of tillers. Phosphate was required for the initiation of the tillers and nitrogen was required for the survival of the tillers to maturity of grain. He concluded that Clinton 59 did not yield as much grain as Ajax or Craig as it did not respond as much to the fertilizers applied.

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SOUTH CAROLINA

"Oat Chlorosis", A New Problem in Oat Production in South Carolina
R. W. Earhart, W. P. Byrd and E. B. Eskew (Clemson)

While the oat improvement work in South Carolina is progressing along the lines of work outlined in previous years, there has been a "spectacular" newcomer to our assortment of problems in the production of this crop. This is the "chlorosis" problem that confronts us, as well as others in adjacent states of Southeastern United States. This situation is manifested by its striking yellow color of affected foliage and appeared in the 1956-57 crop and has reappeared in the current season's crop (1957-58).

To date, while only initial investigations are underway, it has been determined that this situation is not noticeably influenced by soil pH, or nutrition. However, these chlorotic symptoms have been reproduced in the greenhouse by growing susceptible oat varieties in soil infested with isolates of *Helminthosporium* species obtained from affected plants. Additional effort is being devoted to this problem and it is hoped that in the future a more complete understanding will be had of the factors affecting this marked symptom expression and that some feasible control measures can be developed.

A number of varieties and selections were observed to be resistant to this disease and are being used in the breeding program. One recommended variety, Arlington, showed good resistance in the breeding nursery at Clemson. This may offer some relief to growers until we can develop more information about this situation.

Season 1956-57
by S.J. Hadden and H.F. Harrison (Hartsville)

Oats were seeded under generally favorable conditions in the fall of 1956, and since the winter was relatively mild, there was but little cold damage and crop prospects continued good throughout late winter. In the spring, however, conditions became progressively worse.

Various foliage disorders of the Red-Leaf type appearing early in the spring caused widespread and extremely serious damage to the oat crop. In the local breeding nursery, soil-borne mosaic was also very serious and almost completely killed many of the more susceptible lines. Further damage was done by severe drouth conditions during the heading and flowering period, followed by a period of excessively heavy and frequent rains continuing through the normal harvest season. As a result of these various adverse conditions, it is estimated that the oat crop in this area was reduced by about 30-40 per cent in yield. The quality of the grain that was saved was very poor. Nursery tests under such conditions are, of course, considered unreliable.

Suregrain Oats Released

Suregrain (C.I. 7155), a new variety derived from the cross Arlington-Delair x Trispernia, was initially distributed by the Coker's Pedigreed Seed Company in the fall of 1957 as a combination forage and grain type for the Southeastern Coastal Plains region.

Suregrain is intermediate in growth habit. It has short, moderately stiff straw, is medium early in maturity, and bears plump, light red, generally awnless kernels that are markedly similar to those of Victorgrain 48-93, but average slightly higher in test-weight. Three-year average combined forage-and-grain yields of Suregrain have compared very favorably with other southern varieties.

Suregrain is resistant to Victoria blight, all races of loose and covered smut, and to the "216 group" of crown rust races. It is susceptible to the newer crown rust races, 264, 276, etc., and to stem rust. It has shown good resistance to mildew under field conditions, but is moderately susceptible to mosaic.

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TEXAS

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

The commercial average of oats in Texas in 1957 was 2,508,000 acres which was 44 percent above the 10-year average. The fall season was unfavorable but the winter and early spring season were favorable. Drought followed by excessive rainfall and serious disease damage reduced the harvested acreage to 1,651,000 acres which produced an estimated 22.5 bushels per acre for a total production of 37,148,000 bushels.

Diseases caused the greatest damage this season of any since 1930. Several diseases were observed for the first time and total loss was estimated at 28.2 percent of the potential crop or an estimated loss of 14,580,000 bushels. There was also serious damage to the 900,000 acres seeded exclusively for forage purposes. Crown rust, which included the previously rare (in Texas) 213-216 race complex, caused an estimated 11.2 percent loss. *Helminthosporium victoriae* (and probably other species) caused widespread losses particularly in the Victoria derived varieties and reduced yields an estimated 13.7 percent. Stem rust caused some damage while Mildew and Septoria were observed for the first time in Texas.

A varietal survey made this season shows that new varieties developed in the small grain improvement program now occupy the majority of the state acreage. Mustang was grown on 34 percent of the acreage, New Nortex on 29 percent and Alamo on 5 percent. Ten other varieties occupy the remainder of the acreage. As a result of serious damage to Mustang and other Victoriae derivatives by diseases this year there will probably be a swing back to the Red Rustproof strains.

Several pairs of isogenic lines differing only in resistance to race 216 of crown rust have been developed for studies of rust damage and the physiologic nature of resistance. Alamo lines derived from irradiated seed are still being screened for reaction to Helminthosporium blight. Some appear to be of promise but most continue variable in reaction. Efforts to develop short statue oats are encouraging and a few have been placed in replicated tests.

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UTAH

R. W. Woodward (Logan) writes that oats are a relatively unimportant crop in the state. Yields approaching 200 bushels per acre were obtained during the year with no apparent difficulty with diseases or lodging. Overland is the best recommended variety - Ed.

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WISCONSIN

Wisconsin State Yields and Variety Performance

H. L. Shands (Madison)

State-wide yield of oats averaged 52.5 bushels per acre which is the best since 1945, a year with a long growing season when the Vicland variety was grown on 93 per cent of the state's oat acres. The yields in 1957 would probably have been higher except for an invasion of races 216 and 290[1] of crown rust. Race 216 made its ugly entry a few days after heading and became serious mid-way during the filling period. Race 290 appeared in scarce quantity near the end of the growing season. However, experimentally late-sown Clintland showed heavy infection in late August. If race 290 increases in prevalence or severity, some of the newer varieties may not be as effective in resisting rust as had been hoped.

Mildew of oats was noted in the nursery which is the first time oat mildew has been seen in the field of Madison by the writer.

1/ Race identification through courtesy of H. C. Murphy and U.S.D.A. workers at Ames, Iowa.

In recent years the Wisconsin Crop Reporting Service has made a varietal acreage percentage survey and the results are given below for 1957 and the two previous years.

Variety	1955	1956	1957
Branch	26	21	22
Sauk	5	16	24
Clintland	3	13	11
Ajax	11	11	8
Clinton	18	9	7
Bonda	16	9	5
Nemaha	7	7	3
Rodney			6
Others			14

Of particular note is the increase from 16 to 24 per cent for the Sauk variety. Clintland dropped from 13 to 11 per cent, which undoubtedly was a response to the relatively poor showing on farms in 1956. Yield data suggest that 1957 was a "Bond" year. Clintland made a very good showing in 1957, and it is, therefore, anticipated that it will materially increase in acres in 1958. Very probably Beedee and Fayette varieties also will gain substantial acreage in 1958.

Variety Performance

Beedee and Fayette were distributed to seed growers for the first time in 1956. By courtesy of the Seed Certification Service comparative yields were available in 1956 and 1957 for the several oat varieties grown for certified seed. The 1957 results of a similar survey are set forth in Table 1. The lower right hand

Table 1. Seed growers' reports of yields of oat varieties in Wisconsin, 1957. Reports from Seed Certification Service.

Varieties: Paired	Number Comparisons	Yield in Bu. per A.	Varieties: Paired	Number Comparisons	Yield in Bu. per A.
Ajax	26	57.9	Branch	16	53.1
Beedee	26	55.9	Clintland	16	54.6
Ajax	9	49.9	Branch	11	44.9
Branch	9	50.3	Fayette	11	56.4
Ajax	10	57.7	Branch	31	51.7
Clintland	10	51.0	Sauk	31	51.5
Ajax	8	56.0	Clintland	21	53.7
Fayette	8	58.4	Fayette	21	55.3
Ajax	21	57.8	Clintland	32	55.5
Sauk	21	57.4	Sauk	32	54.5
Beedee	32	54.0	Fayette	36	52.5
Branch	32	50.7	Sauk	36	49.1

Table 1 (Continued)

Varieties: Paired	Number :Comparisons	:Yield in :: Bu. per A.::	Varieties: Paired	Number :Comparisons	Yield in : Bu. per A.:	
Beedee	36	61.8	Non-paired		All Fields:	Compared to
Clintland	36	56.5			:	1956 ± percent
			Ajax	30	58.5	+ 12.8
Beedee	54	59.6	Beedee	135	58.8	+ 6.1
Fayette	54	57.0	Branch	39	51.8	+ 6.3
			Clintland	49	57.8	+ 12.9
Beedee	75	56.7	Fayette	73	56.6	+ 8.9
Sauk	75	52.7	Sauk	91	54.2	+ 3.9

corner of the table gives the yield of all fields for which reports were received. Of interest is the increase in yield reported for Clintland and Ajax, both approaching 13 per cent. Increases for other varieties range from 3.9 to 8.9 per cent. Sauk had the lowest increase and this may have been caused partly by its response to crown rust race 216.

When only a few fields are available for paired comparisons varietal differences should not be taken seriously. Results very probably have definite meaning in cases where there are 50 or more paired comparison. Beedee made as good a showing as in the previous year. Fayette also made a good showing which indicates that seed growers placed it where best adapted.

Garry gave very high yields in test plots in 1956. Crown rust reduced yields of this and other "Victoria" varieties in southern Wisconsin in 1957. However, Garry was satisfactory in the northern half of the state.

Minhafer, Garry and Burnett have been added to the list for seeed certification.

New selections of interest currently are X456-4, C.I. 7107; X643-2, C.I. 7266; and X552-1, C.I. 7235.

Cooperation of the Quaker Oats Company is gratefully acknowledged.

Personnel Items. Graduate Assistants in the small grain breeding work, are: R. A. Forsberg, P. E. Pawlish, L. G. Cruger and L. N. Barker. Mr. T. T. Lee from Taiwan became an Assistant in September, 1957. P. E. Pawlish is concentrating his efforts on grain quality phases of oats and spikelet developmental morphology. R. A. Forsberg is working with amphiploids and is trying to transfer certain characteristics from diploid and tetraploid species to hexaploid species of oats of satisfactory type.

ANNUAL WEED CONTROL IN THE OAT NURSERY

H. L. Shands and Z. M. Arawinko

Diuron, (Karmex DL the liquid preparation) has been successfully used in annual weed control in the Wisconsin nursery for two years, without pronounced damage to most lines of oats. Following the report of Buchholtz and Arawinko, grassyweeds have been satisfactorily controlled by applying diuron in 10 to 20 gallons per acre, using approximately .6 pounds of active ingredient per acre. With the help of some graduate students, some observations have been made concerning plant weights and yields after treatment with this herbicide. Herbicidal activity on weeds, and to a lesser extent on oats appeared greater when soil and plant moisture were high.

It is planned that .4 pounds per acre active material will be used in 1958 nursery. Observations are planned in use of Karmex DW, a wettable powder which is said to be less toxic to plant growth than Karmex W.

Since barley is sensitive to Karmex DL, the concentration of .20 pounds per acre will be used in that section of the nursery in 1958.

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VI. NEW OAT VARIETIES (including tentative selections)

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VII. PUBLICATIONS

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(Compiled by A. Norden, Ames)

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60. Jones, K. J. Heritability and dominance estimates for quantitative characters in oats. M.S. Thesis. Iowa State College Library.

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