1984
OAT NEWSLETTER

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Michael S. McMullen, Editor

Matthew B. Moore (Photo by Minneapolis
Star and Tribune, 1982)

DEDICATION

To Matthew B. Moore

Matthew B. Moore, known to most of us as "Matt," a Professor Emeritus in the Department of Plant Pathology, University of Minnesota, was born April 11, 1905 and lived most of his early life on a small fruit farm that is now engulfed by residences in the expanding city of St. Paul. He attended Mechanic Arts High School in St. Paul in 1920, and the School of Agriculture on the St. Paul Campus from 1920-24. He attended the University of Minnesota from 1924-29, ultimately obtaining his B.S. degree. In 1929, he began his career as a technician for the USDA on a cereal rust project. He also joined the staff at the University of Minnesota as an Instructor in the School of Agriculture and as an Assistant in the Department of Plant Pathology that same year. He spent a sabbatical leave at Louisiana State University in 1931-1932 as an Instructor in Botany. He then returned to the University of Minnesota as a staff member in the Department of Plant Pathology until he retired in June, 1973. In 1960 and again in 1962, Matt spent sabbatical leaves as a consultant to the Alaska Agricultural Experiment Station where he advised them on potato disease problems, barley yellow dwarf in cereals, timothy and alfalfa diseases.

Matt played a major role in the development of seventeen oat cultivars released by the Minnesota Agricultural Experiment Station. He worked cooperatively with several oat breeders in the Department of Agronomy and Plant Genetics and the program reflects the philosophy and approaches advocated by Matt. Each of the last six cultivars that have been released possess generalized resistance to crown rust based on their testing in the buckthorn nursery.

Matt has had a significant national and international impact on plant pathology and plant pathologists. His principal contributions have been on diseases of oats, however, his philosophy and fundamental discoveries on broadly-based resistance to fungal pathogens have been applicable to other crops as well. The buckthorn plot on the St. Paul Campus was established in 1953 and expanded again in about 1965 to the consternation of some who condemned the establishment of such rust "race factories." Matt prevailed and, as a result, many lines and six most recent cultivars released by the Minnesota Agricultural Experiment Station have durable resistance to crown rust. In 1952, Matt published an abstract on "the cause and transmission of blue dwarf and red leaf of oats" in which he reported that he had found a virus transmitted by aphids to be the cause of red leaf. Red leaf was later shown to be the same virus that causes barley yellow dwarf, a cereal disease of world-wide importance.

Matt is an avid and dedicated naturalist. Field trips with him were particularly stimulating because of his depth of understanding of crops, their diseases, and his magnitude of perception of a vast array of natural phenomena. Trips down the freeway were avoided if reasonable alternate routes "down the back roads" were available. Fields, woodlands, and pastures were classrooms and the crops and diseases were reviewed and discussed in frequent stops. Sometimes we arrived at our destination late, possibly somewhat weary, but stimulated and wiser.

Matt is innovative with equipment and gadgets. This may have resulted partly because his career stretched back to the time when either funds were limited or equipment to do certain tasks had not been manufactured. Matt developed smut inoculators and multiple rust inoculators; he modified and devised plot planters such as illustrated in the photograph. Many of these gadgets and devices are yet in use in one form or another across the country.

Matt has been a stimulating and challenging educator. Those of you who have had the good fortune to take a course in Introductory Plant Pathology from him remember that as a unique experience. Matt taught this course for approximately 35 years, usually fall and spring quarters and over the years reached probably 3,000-4,000 students. A lab project was usually one component of this course and through this, many students received their first exposure to experimental techniques under Matt's guidance. Some were prompted into careers in plant patholgoy or other sciences because Matt stimulated and encouraged students who appeared to possess a spark of scientific curiosity. It was not uncommon to find Matt and a couple of students investigating cultures of pathogens or discussing their discoveries long after the scheduled lab was over. He undoubtedly taught one of the best courses at the University of Minnesota.

Matt has touched many lives in his long and useful career. He is one of the strongest supporters of the Department of Plant Pathology at St. Paul. His specific and broadly-based contributions are of real and lasting value. Matt has been unable to attend our annual national Phytopathology meetings for several years because of poor health. It is not unusual at these meetings for a dozen or more different acquaintances or former students of Matt to inquire about him and request that I bring a "Hello and Best Regards to Matt Moore" when I return to St. Paul.

Matt currently resides at 1170 Eldridge Avenue, St. Paul, MN 55113 with his wife Dorothy.

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NEWSLETTER ANNOUNCEMENTS AND INSTRUCTIONS

Persons interested in oat improvement, production, marketing, or utilization are invited to contribute to the Oat Newsletter. Previous issues may be used as a guide, but remember that the Newsletter is not a formal publication, and therefore that manuscripts suitable or planned for formal publication are not desired.

Specifically, but not exclusively, we would like to have:

1. Notes on acreage, production, varieties, diseases, etc., especially if they represent changing or unusual situations.

2. Information on new or tentative oat cultivars with descriptions. We want to include an adequate cultivar description, including disease reactions and full pedigree if possible.

3. Articles of sufficient interest to be used as feature articles.

4. Descriptions of new equipment and techniques you have found useful.

Material may be submitted at any time during the year. Please send all contributions and correspondence to:

Michael S. McMullen
Agronomy Dept., NDSU
Fargo, ND 58105, USA

Please Do Not Cite The Oat Newsletter in Published Bibliographies

Citation of articles or reports in the Newsletter is a cause for concern. The policy of the Newsletter, as laid down by the oat workers themselves, is that this letter is to serve as an informal means of communication and exchange of views and materials between those engaged in oat improvement and utilization. Material that fits a normal journal pattern is not wanted. Each year's call for material emphasizes this point. Oat workers do not want a newsletter that would in any way discourage informality, the expression of opinions, preliminary reports, and so forth.

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

AMERICAN OAT WORKERS' CONFERENCE COMMITTEE, 1982-85

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1984 NORTH CENTRAL OAT WORKERS FIELD DAY

K. J. Frey and M. D. Simons

The N.C. Oat Researchers' Field Day for 1984 was hosted by Iowa State University. This field day is passed around to different experiment stations, and this year it was our turn. Three things were especially outstanding about this year's field day:

1. The weather for our social event on Sunday evening, July 1, and the field day on July 2 was beautiful. There was no rain, the sun shone brightly, and the temperature was ca 80°F. It is unusual for a scheduled field event to be treated with this favor by Iowa weather.

2. For the first time, we invited members of the Milling Oats Association to attend the N.C. Oat Workers' Field Day. In response, we had representatives from Quaker Oats Company, National Oats Company, Ralston Purina Company, Carson Grain and Implement Company, (Troy Mills, Iowa), Roebke Seed Company (Hector, Minnesota), Folkert Seed Farms (Allison, Iowa), Werning Seed Company (Vinton, Iowa), Newton Seed Store (Newton, Iowa), and Agricultural Services (Ogden, Iowa). Persons representing these firms, although unfamiliar with the science and technology of oat breeding, pathology, and production research, seemed to maintain a keen interest throughout the field day. The Milling Oats Association provided the luncheon at The Broiler for all field day attendees.

3. The attendance at the field day was an amazing 70 persons. This was especially gratifying because the largest number that has ever attended a North Central Oat Workers' Field Day previously was 25. Granted, 17 of the persons attending were from the Milling Oats Association, but this still leaves a number that was double any previous attendance. We had nine persons from the University of Wisconsin, one from Pennsylvania State University, 11 from the University of Minnesota, two from North Dakota State University, two from the University of Illinois, two from South Dakota State University, one from Ohio State University, one from Michigan State University, and one from the University of Manitoba. Additionally, there were two from the headquarters office of the Milling Oats Association. Could it be that Iowa State is still the "Mecca" for oat researchers?

To have such a large attendance and such fine weather for the 1984 N.C. Oat Researchers' Field Day was especially meaningful to us. This field day is hosted by a given university in the North Central Region about every decade, so it is probably the last one for which we will serve as the hosts, since within the next decade, both of us will retire from our present positions.

DATA TELECOMMUNICATIONS

Keith D. Gilchrist
USDA-ARS

An alternative way to send data to oat breeders is electronic data transmission. The Cereal Crops Research Unit (CCRU) has an IBM PC with a Hayes 1200B internal modem. Software enables communication with bulletin boards, mainframes, and other personal computers. Public domain software such as Kermit enables the lab to link up with mainframes supporting Kermit. Packages supporting the public domain XMODEM protocol work with micro to micro links. The CCRU's Hayes modem can operate at 110 or 300 or 1200 baud, 7 or 8 data bits, odd or mark or even or space or none parity, and 1 or 2 or more stop bits. Parameters and programs for communication must match at both ends of the link. The CCRU uses four software programs: Hayes Smartcom II, PC-TALK III, Kermit, and RBBS CPC 12.0 The RBBS CPC 12.0 software configures the IBM as a remote bulletin board system where a caller can download (transfer to their own PC) files or leave messages. A PC using PC-TALK III is the ideal link with RBBS 12. Two PC's can talk to each other using PC-TALK III or Kermit. Three programs now support the XMODEM protocol where data is transmitted in packets from one computer to another. Kermit uses a different protocol, but it serves the same purpose; accurate data transmisssion with error checking. These programs would enable quick data transmission of results back to breeders directly. Plant breeders currently receiving data from the CCRU via U.S. mail who wish to attempt electronic data transmission should contact Keith Gilchrist at (608) 262-6588.

IDENTIFICATION OF OAT CULTIVARS BY COMBINING POLYACRYLAMIDE GEL ELECTROPHORESIS AND REVERSED-PHASE HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

G. L. Lockhart
U.S. Grain Marketing Research Laboratory, ARS, USDA
Manhattan, Kansas, U.S.A.

Prolamins were extracted from 23 U. S. oat cultivars and their polyacrylamide gel electrophoretic patterns were obtained. The cultivars consisted of the top seven commercially-grown varieties from each of the five major oat producing states; Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin. Ten of the cultivars were readily differentiated by their electrophoregrams. The other 13 cultivars were segregated into three groups. The members of each group had identical electrophoregrams and generally had very similar pedigrees. The prolamin extracts of the individual members from each group were also subjected to reversed phase-high performance liquid chromatography (RP-HPLC). Small differences in their chromatograms allowed differentiation of the members in each group.

Reference: Cereal Foods World 29:507. 1984.

CHARACTERIZATION OF OAT SPECIES BY POLYACRYLAMIDE GEL ELECTROPHORESIS AND HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY OF THEIR PROLAMIN PROTEINS

G. L. Lockhart and Y. Pomeranz
U.S. Grain Marketing Research Laboratory, ARS, USDA
Manhattan, Kansas, U.S.A.

Prolamin proteins in the groats of 14 oat (Avena) species were characterized by polyacrylamide gel electrophoresis (PAGE) and high pressure liquid chromatography (HPLC). Generally, complexity of PAGE and HPLC patterns increased as ploidy of the selections increased from diploid (five species) to tetraploid (four species) and to hexaploid (five species). PAGE was more powerful in differentiation among species than HPLC.

Reference: Cereal Chemistry. In Press. 1985.

OATS AS A FEEDSTUFF FOR LIVESTOCK

R.L. Harrold

The advantages of oats as a source of nutrients for animals is frequently overlooked. One explanation may be the variation in nutritive concentrations associated with cultivar and location of production.

The nutrients of major economic importance include energy, some factor of protein content or protein quality, and total or biologically available phosphorus. (Available amino acids and available phosphorus would be appropriate factors for nonruminant animals.)

Partial nutritional value (PNV) is a technique used to compare the relative merits of alternative feedstuffs. Corn is often selected as the reference feedstuff for energy, soybean oil meal is the usual reference feedstuff for protein factors, and dicalcium phosphate is used as the reference feedstuff for the phosphorus factor.

Oats is an energy feed. The nutritional value of oats is the sum of:

1) Its energy content (relative to the value of energy from corn),
2) The value of the increased protein or amino acid content, relative to the content of corn (using the value of that protein factor calculated from the price of soybean meal), and
3) The value of the additional phosphorus, relative to the phosphorus content of corn (using the value of the phosphorus present in dicalcium phosphate).

The value of the nutrients in heavy oats as a feedstuff for swine may be calculated from the following assumptions:

1) Corn; \$2.35/bu., 3400 kcal DE/kg, 0.20% available lysine, and 0.03% available phosphorus,
2) Soybean oil meal, \$160/T., 2.40% available lysine,
3) Dicalcium phosphate, \$300/T., 16.2% available phosphorus, and
4) Oats, 3125 kcal DE/kg., 0.45% available lysine, and 0.144% available phosphorus.

The value of the nutrients in heavy oats is the sum of: \$77.14 + 16.67 + 2.11 = \$95.92 per ton. At \$2.35 per bushel, corn would cost \$83.93 per ton. Because of its relatively high energy content and its "bonus" values for available lysine and available phosphorus, heavy Northern oats are actually worth more per pound (or per ton) than corn!

The nutritive characteristics of oats may be increased by decreasing or eliminating the hull (to increase the energy content) as well as by increasing the protein and amino acid content of oats. Yield of nutrients per acre, not simply pounds of grain per acre, may be used as a selection criterion.

OATS STRAW IS A VALUABLE CROP RETURN

A. B. Roskens

Oat straw is quite possibly one of the most missed returns when figuring crop profitability. Few farmers are maximizing their returns when it comes to this portion of an oats crop. Many farmers look for a short strawed oats variety in order to prevent lodging. In many cases, this lodging problem could have been controlled by use of a more balanced fertility program, including more phosphorus and/or potash. The increase in grain yield and straw tonnage can well offset the fertilizer cost in most of these cases.

If a farmer intends to sell his straw crop for bedding or feed, he must market it as he would any other commodity - timely and profitably. Harvest time prices for straw are usually the lowest of the year and can result in unnecessary labor and equipment costs. Farmers who sell their straw prior to harvest can usually obtain higher prices and can arrange for the baling and transportation in the most profitable manner for their own operation. Some farmers prefer not to bale, handle or transport the straw themselves, while other producers decide that the increased price of loaded and/or delivered straw offsets their labor and equipment cost. Some farmers also prefer to store their straw and try to take advantage of winter markets. In any case, however, the important factors to remember when selling straw are: 1) Clean, bright straw (free of weeds) commands higher prices; and 2) Sell the straw for the highest net price, even if it involves selling it at a distance from your farm. Most farmers agree that it does pay to advertise.

If oat straw is to be used as a feed supplement, the livestock producer should consider the feed value similar to that of corn stover. To increase the palatability and raise the TDN, add molasses or some other additive. In years of tight hay or silage supplies, this can be a very profitable alternative.

Many farmers prefer to utilize their straw as organic matter and fertilizer. It is estimated that 1-1/2 tons of straw contains approximately 20 lbs. of nitrogen, 10 lbs. of P_2O_5, and 60 lbs. of K_2O. When this is added to the soil conservation benefits, some farmers elect to plow it down or simply spread it on the top as cover. This option probably would not be the best economic situation for the livestock producer; however, the value should be considered if the straw cannot be harvested.

In summary, oat straw can be a valuable portion of an oats crop and needs to be properly managed just like any other commodity in order to maximize net returns per acre. We encourage all oats producers to carefully consider all the options and values available from their straw when planting an oats crop.

Is Victoria Blight Attempting a Comeback?

M. B. Moore and P. G. Rothman
The University of Minnesota and USDA

Victoria blight might have been forgotten but it's not gone. We reported the reappearance of H.v. in the St. Paul oat plots in 1979 after an absence of 16 years (1979 Oat Newsletter, p. 56). At that time we listed the susceptible lines but would like to include an additional line that was heavily damaged in our St. Paul nursery in 1984. The Minnesota line Ag. 27/Lodi has been in the International Oat Rust Nursery so anyone using this line as a crown rust resistant parent should be aware of its susceptibility to H.v.

STATUS OF INTERNATIONAL OAT RUST NURSERY PROGRAM

by J. G. Moseman
USDA, ARS

The two objectives of the International Oat Rust Nursery (IORN) program are (1) to permit cooperators to have their advanced selections and potential cultivars tested to pathogenic strains of the rust pathogens in the field at many locations and (2) to obtain new diverse rust resistant germplasm by observing the advanced selections and potential cultivars in their nurseries. Many individuals are cooperating to enable the program to achieve the two objectives.

The cooperators were sent reports with the useable data compiled from the 1982 and 1983 IORN's. (See table 1). Seed of the 1984 and 1985 IORN's have been distributed to the cooperators. (See table 2). Copies of the reports on the 1982 and 1983 IORN's can be obtained by writing J. G. Moseman, coordinator of the IORN program.

Table 1

Useable data obtained from 1982 and 1983 International Oat Rust Nurseries

		Number Locations		Total
Year	Nursery	Crown Rust	Stem Rust	Locations
1982	IORN	11	8	21
1983	IORN	11	10	25
Total		22	18	46

Table 2

Seed Distribution for 1984 and 1985 International Oat Rust Nurseries

		Total	New Entries		Locations	
Year	Nursery	Entries	Number	Cooperators	U.S.	Foreign
1984	IORN	164	62	7	17	28
1985	IORN	174	48	7	18	32

Rusts of Oats in the United States in 1984

A. P. Roelfs, D. L. Long, D. H. Casper and M. E. Hughes
Cereal Rust Laboratory

In 1984, stem rust was first observed in early April in nurseries at Zaragosa and Anahuac, Mexico; and on wild oats in Yolo county, California. No oat stem rust was found in Beeville, Texas until early May, nearly four weeks later than the 40-year mean. By mid-May traces of stem rust were found in scattered locations throughout south Texas and at Fairhope, Alabama. These southern areas provided inoculum for the northern oat growing region where rust occurred in light amounts, by early June. By early July stem rust was found throughout the northern Great Plains. However, because of light amounts and late arrival of the rust, losses were light except in late-planted fields. The severity of stem rust in eastern North Dakota and Minnesota on wild oats (Avena fatua) was greater than normal.

The most prevalent race in the U.S. in 1984 was race NA-27 making up 94% of the isolates, (Table 1). This race has predominated in the U.S. population since 1965. However, NA-27 has caused only one moderately severe epidemic, in 1977. Race NA-16 which is more common in the population obtained from wild oats and susceptible cultivars, was again the second most frequently identified race in 1984, making up 3% of the population. Race NA-5, which made up 2% of the population was found scattered throughout the U.S. and was the most common race in California. NA-10 occurred only in California. Race NA-24 was found both in Texas and Ontario, and NA-23 was detected only from wild oats in North Dakota. Race NA-10, NA-23 and NA-24 were found in trace amounts. Only race NA-27 was obtained from collections of stem rust made in Mexico.

In 1984, there were few reports of crown rust in the southern U.S.. In fact, the first reports of significant rust were in mid-July, scattered throughout the northern oat growing area. Much of this rust developed in eastern South Dakota and southern Minnesota fields where inoculum arrived early from the south and conditions were conducive for rust development. In a few cases buckthorns growing in close proximity to oat fields provided some of the initial inoculum. Losses were light throughout the country.

Table 1. Physiological races of *Puccinia graminis* f. sp. *avenae* identified from oats in 1984.

State	Source of coll.	Number of coll.	Number of isol.	Percent of isolates of each race[1] NA-5	NA-10	NA-16	NA-23	NA-24	NA-27
AL	Nursery	1	2			50			50
CA	Nursery	1	3		100				
	Wild oats	3	9	67	33				
IA	Field	3	9						100
	Nursery	2	6						100
IL	Nursery	8	22			4			95
KS	Field	1	3						100
	Nursery	1	2						100
MN	Field	36	106			1			99
	Nursery	5	14			21			78
	Wild oats	12	35			6			94
ND	Field	8	21			19			81
	Nursery	9	25	4					96
	Wild oats	42	110	1		4	4		91
NE	Nursery	3	9						100
SC	Field	1	3						100
	Nursery	2	4						100
SD	Field	9	22						100
	Nursery	5	13						100
	Wild oats	1	3						100
TX	Nursery	58	153	1		1		1	97
WI	Field	26	51						100
WV	Field	1	3						100
USA	Total	238	628	2	1	3	1	*	94
CAN	Field	4	5						100
	Nursery	5	4					75	25
MEX	Nursery	2	4						100

[1] See Martens et al. Phytopathology 69: 293-294.

* Less than 0.6%

Continued Interest in Hull-less Oats

Paul G. Rothman
USDA and the University of Minnesota

While interest has surfaced recently on the development of hull-less oats (1983 Oat Newsletter, p.12) only scattered references can be found dealing with rust resistance of the naked oats. Stem rust gene Pg10 was identified in Chinese Hull-less: CI 1575 but its mesothetic reaction does not render it a useful source of stem rust resistance. None of the crown rust Pc genes trace to a source of hull-less oats. In general, the hull-less oats are very susceptible to both oat rusts.

A recent collection of Chinese oats obtained by the Quaker Oats Company has been released to oat workers. The 26 entries (PI 447272 thru 447297) were screened for reaction to crown rust using a composite of races from the St. Paul buckthorn plots and with stem rust races NA 17, 26, 27, and 30. Only entries PI 447272, PI 747274, PI 747275 and PI 747276 proved to be hull-less oats and the 4 entries were susceptible to both rusts. Entries PI 447278 and PI 447290 possess either stem rust gene Pg2 or Pg4, but otherwise no crown rust or stem rust resistance was found in the lines.

An unusual hull-less oat line with lemma awns, very similar to the one reported by V. D. Burrows (1980 Oat Newsletter, p. 32), was found with resistance to all the buckthorn races of crown rust and to all the present prevalent races of stem rust. The F_5 line is robust in growth habit but late in maturity. Its pedigree is: AMAGALON/A.NUDA//AMAGALON/4/DAL/ALPHA/ /AMAGALON/MINHI #8/3/MARVELLOUS/5/DELREDSA//AMAGALON/MARVELLOUS. Seed is available for distribution.

NEW SOUTH WALES OAT CROP 1984-85

R. W. Fitzsimmons

The area sown to oats is estimated at 460,000ha, the lowest area for many years. This followed the record area of 1,168,000ha sown in the previous season. About 336,000ha were harvested for grain in 1984-85 producing 547,000 tonnes at an average yield of 1.63 t/ha, the highest yield on record. In the previous season 1,120,000 tonnes were harvested, an all time production record.

The reduced area sown to oats in 1984 followed the record grain production in the previous season and a plentiful supply of pasture for stock because of good summer rains. A large proportion of the area was sown in the autumn with the intention of utilising it as a dual purpose crop. However, less grazing than usual was carried out because of the availability of other pastures.

Mostly dry, warm weather was experienced during the harvesting period resulting in the production of high quality, sound grain.

OAT PRODUCTION IN VICTORIA

M. W. Price

The area sown annually to oats in Victoria has remained comparatively stable over the last few years (Table 1) in spite of the 1982 drought and the late start to the 1983 growing season. The 1984 season was also marked by a delay in sowings, due to the absence of the usual autumn break bringing sufficient rainfall in late March or April. Delayed sowing time tends to reduce the proportion of cropping land allocated to oats as wheat and barley are favoured for later sowings. The dry beginning of the 1984 season was followed by very wet winter months conducive to the development of several leaf diseases.

Crown rust was very common in the higher rainfall regions in 1984, and so was Red leather leaf disease (*Spermospora avenae*) which was not identified in Victoria until 1978. Halo blight and Bacterial stripe blight (resp. *Pseudomonas syringae* vars. *coronafaciens* and *striafaciens*) although rarely encountered in Victoria, were observed at many locations this year. Stem rust was prevalent throughout the State, but the epiphytotic appeared to be retarded by a very dry spell during early spring with many crops escaping serious damage.

A new high yielding cultivar, Bundalong, was released from the oat breeding project conducted at the Victorian Crops Research Institute. This oat is intended for the medium to high rainfall districts of Victoria.

TABLE 1 AREAS OF OATS, WHEAT AND BARLEY IN VICTORIA ('000 hectares)

YEAR	OATS		WHEAT	BARLEY
	grain	all purposes		
1981	245	330	2,467	459
1982	213	345	1,381	292
1983	320	420	1,620	404
1984	260P	314P	1,551P	535P

P = preliminary estimate

OATS IN MANITOBA - 1984

R.I.H. McKenzie, P.D. Brown, D.E. Harder, J. Chong, and S. Haber
Agriculture Canada, Research Station, Winnipeg, Manitoba

1984 was again hot and relatively dry, particularly in the western part of Manitoba. However, yields were very good in the eastern half and averaged 1.94 tonnes per hectare on 231,000 hectares over the entire province. Total production was up 11% over 1983. Fidler was again the most common variety being sown on 65% of the area while Harmon was sown on 15% and Hudson and the new variety Dumont were each sown on 10%.

In 1984, Ariane Plourde completed her masters degree on "The effect of lemma colour on grain quality in Oats". She studied near isogenic F6 lines of contrasting lemma colour. Red lemma colour was significantly associated with a lower hull percent and a lower test weight in the white versus red and yellow versus red comparison. Although showing no difference in 1983, white oats were of better quality than yellow in 1984 with significantly lower hull percent and higher test weights. Black lemma colour was associated with high hull content and low test weight. Seed colour was not associated with 1000 kernel weight, % protein, yield, height or maturity.

Tom Warkentin has undertaken a masters study on the hoegrass tolerance in oats obtained from several sources. Preliminary results in 1984 look good.

Alison Baillie, a Masters student, is screening selected diploid and tetraploid *Avena* accessions for stem rust resistance. She is making intraspecific crosses to study the inheritance of resistance and interspecific crosses with *Avena sativa* L. as one of the parents in attempts to transfer oat stem rust resistance to the hexaploid.

Doug Brown finally completed all requirements for and received his Ph.D. from the University of Wisconsin in 1984. The primary goal of the research was to induce and identify a translocation of *Pg*-16 from *Avena barbata* Pott., collection D203, to *A. sativa*. Monosomic alien substitution, monosomic alien addition, and disomic alien addition lines were exposed to gamma radiation to induce a translocation and subsequent generations were screened for monogenic ratios. Several translocation lines were identified although in all these translocation lines the added gene, *Pg*-16, was not transmitted entirely normally through the gametes. The agronomic performance of related hexaploid lines in which the *A. barbata* chromosome carrying *Pg*-16 was absent, substituted (monosomic and disomic alien substitution) or added (disomic alien substitution) was also studied. It was found that the substitution or addition of the *barbata* chromosome pair carrying *Pg*-16 resulted in reduced yield and plant height, improved lodging resistance, and no change in test weight.

The Oat Rusts in western Canada

The year 1984 saw one of the lightest infections of both crown rust and stem rust so far observed in western Canada. Both rusts were first observed

in Manitoba at their normal time about mid-July, but drought conditions over most of the prairie region severely limited further spread. Any infections that occurred were essentially limited to the Red River Valley of Manitoba. There were no significant losses to either crown or stem rust.

There were no significant new physiologic races of crown rust. For stem rust, one new race, NA55, was isolated from Ontario. This race is similar to NA25 which predominates in eastern Canada, but is virulent on lines with gene Pg-16. This gene has just recently been isolated from Avena barbata, and is potentially a major contributor to breeding for stem rust resistance.

Survey of natural barley yellow dwarf infections in Manitoba - 1984

The incidence of barley yellow dwarf virus (BYDV) infection was found to be considerably lower than in recent years. Aphid vectors were later than usual in arriving in barley, oat and wheat fields surveyed in eastern and central southern Manitoba; in early June when growth of cereal stands was already well advanced, only scattered incidences of feeding vector species were observed. The overwhelming majority among detected vector species were English grain aphids. The isolates obtained from the field survey were all of the cherry oat aphid non-specific strain (PAV-type of BYDV).

Personnel Changes

Dr. Cliff Gill is on indefinite sick leave pending retirement.

ONTARIO

Dormancy Studies: Dormoats

J.A. Frégeau and V.D. Burrows

Dormoats possess seed dormancy genes from A. fatua L. combined with those commonly found in successful cultivars of A. sativa L. After harvest, dormoat seeds have to be allowed to after-ripen (an oxygen dependent reaction) so that they will germinate in springtime but they have to be induced into a state of secondary dormancy during, or at the end, of the after ripening period so that they will not germinate in autumn or rot during winter.

A field experiment was planted in early September with freshly harvested seeds from two dormoats, OA 499 and OA 635-3, and one oat cultivar, Donald. The seeds were mixed with soil, in plastic mesh bags and sown in the field for retrieval at various times in the fall and winter to assess the dormancy status of the ungerminated seeds left in the soil i.e., innate primary dormancy or naturally induced secondary dormancy. All the seeds from Donald germinated within a month of field planting. OA 635-3 had approximately 50% of its seeds induced into secondary dormancy during that same period; for OA 499, the percentage of ungerminated seeds corresponded to the seeds still in primary dormancy at planting time.

A protocol to successfully induce secondary dormancy in dormoats is also being sought. Induction was initiated within two days by incubation of moistened seeds in a humid atmosphere at 40°C. Maximum number of induced seeds was obtained within four to seven days depending on the dormoat strain. Induction treatment was most effective on seeds fresh out of after-ripening; six month old seeds were not induced by the treatment.

Expression of secondary dormancy was influenced by the presence of the hulls. After-ripening for up to 16 weeks, in the dry state also led to partial disappearance of the dormancy. Furthermore, secondary dormant seeds kept in moist soil for 3 weeks were stimulated to germinate by a desiccation period followed by reimbibition with water.

BYDV resistance in oats.

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Three lines combining some BYDV resistance with good agronomic qualities have yielded well in Canadian trials; these are Q.O. 199.27, Q.O. 199.60 and Q.O. 191.70.

In the International Oat Rust Nursery, one Quebec line, 76 S6-1454, is outstanding. This line has shown good BYDV resistance in Quebec, in Illinois, in New Zealand and also in Ecuador. In the same trial, W80588, W80135 and RDY PG15 also had outstanding BYDV resistance.

We are trying to build up a collection of the best BYDV-resistant oats of worldwide origin. The 1984 trials were not definitive due to some germination problems in some of the oat trials. By 1986, we hope to put together an international BYDV nursery that would be made available to scientist from other countries.

PERSPECTIVES OF OAT PRODUCTION IN THE DOMINICAN REPUBLIC

Ing. Heriberto Alonso

The Dominican Republic is entirely dependent on imported oats consumption in the country, resulting in high prices for imported oats. To reduce the amount of imported oats required an oat production program has been initiated in the country, to attain self-sufficiency in this crop.

Actually, the company "Cereales en General C X A" of the Dominican Republic is developing a research program in collaboration with the Quaker Oats Company, with the objective of selecting promising materials which could be produced locally. This program includes the observation and evaluation of the adaptability and yield of available materials.

Field research was initiated in 1983 in the "Estacion Horticola de Constanza" which has the following geo-climatic conditions; 18 54' north latitude, 71 46' west longitude, an altitude of 1,164 meters above sea level, a median temperature of 18.1° C and annual rainfall of 1033 mm with 103.7 days of rainfall/year.

The first field trial was planted October 13, 1983, with the objective of determining lines with potential for adaptation in our country. This includes the "1983 Experimental Oat Nursery of the International Oat Breeding project sponsored by the Quaker Oats Company". The materials for this nursery were supplied by Mr. Donald Schrickel from the United States and includes 360 lines.

This group of lines had a generally good development and 16 of these lines were selected for further evaluations including grain yield potential.

A second field trial was established on May 12, 1984 with the objective of evaluating grain yield. This trial included the 16 previously selected lines and a new group which included 116 lines with other favorable traits.

From these two trials 10 lines were selected from the first group (Table 1) and 11 lines were selected from the second group (Table 2).

The selected lines were planted in Jarabacoa town Dominican Republic on Dec. 9, 1984 for further evaluation.

Table 1. First selection nursery.

Line designation	Yield kg/ha	Days to heading	Days to maturity	Height (cm)
*1 - 78 SA 17/C7512/CR Cpx	1632	55	95	81
*2 - 79 Barrow Seln	1352	51	97	75
*3 - Dal/Tx 71C3093-2	1724	51	97	70
*4 - PA 78.10	1492	51	97	80
*5 - ME1554 CR cpx/ 76Ab 532-2/SR cpx	2013	52	97	63
6 - C7512/SR cpx	2721	64	115	68
*7 - Coker 75-12/SR cpx	2225	64	115	69
*8 - Coron/Ctz/Pendek/ ME1563	2108	57	112	66
9 - C7512/SR cpx	3117	64	115	73
*10 - C7512/SR cpx	1960	66	115	70
11 - C5-2, 1563 CR cpx/ T312/SR cpx	2770	72	120	80
12 - 80 SA 65(79 Bordenave Seln/Kenya)	1419	72	120	80
13 - 76-19*2/CI9221/79-23	3006	61	112	62
14 - "	1935	63	112	75
*15 - C 234/74C70	2325	56	99	63
*16 - 80Ab2726/(69Ab 5245/C7512/SR cpx) /JHG-8/80GH SA 141	1298	54	97	65

*Varieties chosen for further selection.

Table 2. Elite nursery.

Line designation	Yield kg/ha	Days to heading	Height (cm)
*1 - PA 7967-9010	1438	48	85
*2 - PA 8098-9433	1295	60	88
3 - Terra	1813	63	88
4 - W81204	1214	63	103
5 - Coker 82-29	1851	58	85
*6 - Coker 82-30	2361	48	85
*7 - 02501	2096	59	105
*8 - Ogle	2554	61	104
*9 - X2795xX2682xC62-26	1931	54	100
*10 - X2505-4	1442	54	100
11 - Coker 234	2052	60	78
*12 - H-833	2662	67	90
*13 - 81-C-705	1738	67	89
14 - 82-C-6036	1323	69	94
*15 - 82-C-6311	2324	54	80
*16 - 82-C-6317	2047	60	90

*Varieties chosen for further selection.

PHYTIC ACID CONTENT OF SOME OAT VARIETIES AND ITS CORRELATION WITH CHEMICAL AND AGRONOMIC CHARACTERS

Marketta Saastamoinen and Tiina Heinonen

Phytic acid, the hexaphosphate of myoinositol is a major storage form of phosphorus (P) in oats and other cereal grains. For ruminants phytic acid is an important phosphorus source, but in humans and monogastric animals it may cause serious mineral deficiencies in the diet (Roberts and Loewus 1968). Phytic acid may cause deficiencies of Ca, Zn, and possibly Fe for monogastric animals and humans by the chelating ability between the phosphorus of the phytic acid and the minerals. Zinc and calcium and zinc and copper are in particular bound by the phytic acid (O'Dell 1969). Some results have indicated that iron is bound by the phosphorus of the phytic acid (e.g. Davies and Nightingale 1975) while in some other experiments no chelating effect has been found (e.g. Welch and Van Campen 1975). The microflora of ruminants have an enzyme, phytase (Taylor 1965), which destroys the chelating ability of phytic acid by hydrolysing the phytic acid (Punj et al. 1969). In bread-making the phytic acid is partly destroyed during fermentation, proofing and baking (Tangkonghciir et al. 1981).

Another harmful effect of the phytic acid is its ability to inhibit some amylolytic and proteolytic enzymes. Phytic acid has been found to inhibit pepsin activity (Camus and Laporte 1976), α-amylase activity in vitro (Cawley and Mitchel 1968, Sharma et al. 1978) and trypsin activity in vitro (Singh and Krikorian 1982).

Phytic acid is found in the seeds of many cereals, oil crops and legumes e.g. barley, beans, maize, cotton, oats, peanuts, peas, rape, rice, sesame, soya, sunflower and wheat (see review MAGA 1982).

Differences in phytic acid content between oat varieties have been very little studied. At the Department of Plant Breeding at the Agricultural Research Centre the varieties and breeding lines in experimental trials were studied in respect of their phytic acid content. The trials were established in 1982 and the analyses of phytic acid were made in 1983. The analyses were made according to Miller et al. (1980). All chemical analyses were made from whole milled grain including hull and bran. Four experimental trials were established. Some oat varieties and lines were in all four experimental trials and some varieties were only in one trial. The mean values of the phytic acid contents and some other agronomic characters of these oat varieties are given in Table 1. Caesar, the hull-less oat variety, has a much higher protein and phytic acid content compared to the other oat varieties. The high protein and phytic acid content of the Caesar variety is, of course, caused by its hull-less character. There are differences in phytic acid content between the normal oat varieties. There is a low phytic acid content in the late and middle late varieties Puhti, Ryhti, Svea and Hankkija's Vouti. Early varieties have a higher phytic acid content and higher protein content (Table 1). The differences in phytic acid content were not statistically significant between the oat varieties as the number of trials was not high. Ashton and Williams (1958) have not found significant differences in the phytic acid content of four oat varieties. Miller et al. (1980), however, have found small differences in the phytic acid content of four oat varieties grown in four years at three locations.

Linear regression equations and correlation coefficients were calculated for the phytic acid content and other agronomic characters of the oat varieties. Calculations were made excluding Caesar, the hull-less oat variety. The highest positive correlation was obtained between the protein content and the phytic acid content, $r = 0.9017^{***}$ ($n = 10$). A rather high negative correlation was found between the growing time and the phytic acid content, $r = -0.6973^{*}$ ($n = 10$). When the calculations were made from whole oat material including oat lines the correlations were much lower.

Phytic acid is located in the oat grain in the protein bodies (aleurone grains) of the scutellar parenchyma and the aleurone layer (Fulcher et al. 1981), which goes a long way towards explaining the high positive correlation between the protein content and the phytic acid content. It seems that the protein content and the phytic acid content are positively associated with each other. However, the lower correlation coefficients calculated from the whole oat breeding material indicate that exceptions to this correlation may occur and that it may be possible to breed for a combination of high protein content and low phytic acid content.

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Table 1. Means of phytic acid content and some agronomical characters of some oat varieties grown in 1982 at Jokioinen in Finland

Variety	Number of trials	Growing time days	Grain yield kg/ha	Prot. %	Hull %	1000 g.w.g	Phytic acid %
Puhti , standard	4	96	6163 (=100)	14.7	23.0	38.5	0.693
Ryhti	4	+5	90	-0.2	+1.7	+0.6	-0.001
Nasta	4	-1	82	+0.9	+2.1	-4.4	+0.041
Veli	4	-2	86	+0.5	+2.8	-2.6	+0.048
Pol	4	-9	71	+1.5	+4.7	-7.9	+0.069
Titus	2	-3	85	+0.6	+3.8	-0.5	+0.086
Jo 1033	2	-4	92	+2.1	+2.2	-4.2	+0.114
Svea	1	+2	95	-0.4	+3.1	-3.0	-0.035
Hankkija's Vouti	1	+5	92	-0.3	+1.9	-0.5	+0.005
Kalott	1	-10	81	+1.0	+5.8	-1.9	+0.062
Caesar, hull-less	1	±0	48	+8.2	-23.0	-8.2	+0.425
Correlation coefficient,r, between phytic acid content and other characters calculated excluding Caesar		-0.6973 *	-0.5101	0.9018 ***	0.4221	-0.4096	

NITROGEN APPLICATION AND QUALITY OF FORAGE OATS

Bhagwan Das, K. D. Taneja, and P. S. Gill

Due to the increase in the dairy industry in recent years the use of forage oats has increased. There is much interest in the production of quality forage by the application of nitrogen fertilizer. No information is available concerning the effect of soil applied nitrogen versus foliar application and hence the present investigation was undertaken.

The experiment was conducted with oat variety HPO-114 and rows were sown 25 cm apart using 100 kg seed/ha following an application of irrigation water. The experiment was conducted for two years.

Application of nitrogen either to the soil or as a foliar spray enhanced the crude protein and *in vitro* dry matter digestibility percentages when compared with the control, and the best results were obtained when 120 kg nitrogen per hectare was soil applied, followed by 30 kg soil applied nitrogen and 30 kg foliar application sprayed 10 days before flowering (Table 1).

Crude protein and digestible dry matter yields increased almost linearly with the application of nitrogen through the soil. Highest crude protein and digestible dry matter yields were obtained with 120 kg N/ha. The treatment of 30 kg N/ha soil applied plus 30 kg N/ha foliar applied 30 days before flowering resulted in the most economic use of nitrogen relative to yield increases.

Table 1. Effect of soil and foliar application of urea on oat forage.

Treatment	CP%	IVDMD %	Yield CP	Yield DDM
N 0 - Control	4.92	45.40	2.59	23.92
N 1 - 30 kg N/ha (Soil)	4.90	60.80	3.56	46.95
N 2 - 60 kg N/ha (Soil)	6.67	60.60	5.84	53.47
N 3 - 90 kg N/ha (Soil)	6.23	63.90	5.55	57.12
N 4 - 120 kg N/ha (Soil)	8.85	65.80	8.02	59.36
N 5 T_1 - 30 kg (S) + 30 kg (F) N/ha	7.54	67.60	6.46	58.52
N 5 T_2 - " "	6.44	62.80	6.13	60.05
N 5 T_3 - " "	7.10	62.70	7.43	65.43
N 6 T_1 - 60 kg (S) + 30 kg (F) N/ha	7.32	66.10	6.29	56.92
N 6 T_2 - " "	6.23	53.60	6.09	52.41
N 6 T_3 - " "	7.22	61.10	7.07	59.90
N 7 T_1 - 90 kg (S) + 30 kg (F) N/ha	7.65	60.00	6.06	47.46
N 7 T_2 - " "	5.13	51.10	4.85	48.18
N 7 T_3 - " "	6.78	56.10	6.57	54.04

Spray on: T_1 = 10 days before flowering.
T_2 = 20 days before flowering.
T_3 = 30 days before flowering.
S = Through Soil.
F = Foliar Spray.

CP = Crude Protein
IVDMD = In vitro dry matter digestibility.
DDM = Digestible Dry Matter

PERFORMANCE OF SOME NEW OAT STRAINS FOR FODDER PRODUCTION IN KASHMIR VALLEY

Bimal Misri, R. N. Choubey, and S. K. Gupta

Jammu and Kashmir are among the largest livestock rearing states in India with an animal population of about 5.7 million. According to an estimate made by Bhat et al. (1980), the total annual fodder requirement is 8.55 million tons dry matter with only 3 million tons available from all sources. Most of the available fodder is produced in the Jammu region, while the Kashmir valley is traditionally a monocrop belt. Most of the valley land is under horticulture or rice cultivation. During winter months, most of the cultivable land remains fallow and the livestock are fed with paddy straw only. The valley has to depend on large scale importation of various livestock products as the local production is considerably reduced due to lack of nutritious fodder.

During 1973, the Indian Grassland and Fodder Research Institute introduced oats as a winter forage crop at its Manasbal regional station in Kashmir valley. This proved successful under the temperate climatic conditions of the valley and gradually farmers started growing oats during the winter season. The present study was undertaken to assess the performance of some oat strains developed by the oat breeding project at Jhansi, the headquarters of this Institute.

Five new oat strains, JHO 801, JHO 802, JHO 810, JHO 815 and JHO 819 were tested in replicated field trials during the 1983-84 winter at Manasbal. The variety "Kent" was included as a "check" in this trial. "JHO 810" exhibited the highest forage production potential in comparison to all other genotypes (Table 1). It produced 49.4% and 48.6% more green and dry matter respectively at 50% flowering stage than the check variety "Kent". This strain is characterized by erect dark green leaves and high tillering ability.

Based on these preliminary observations, we plan to test the potential of the newly developed strain "JHO 810" at a large number of locations in the valley.

Reference:

Bhat, A. R., I. S. Bakhshi, B. Misri and A. R. Zargar. 1980. Project report on development of fodder and livestock resources in Jammu and Kashmir. Animal Husbandry Department, J&K Govt., Srinagar.

Table 1. Performance of selected oat strains for different forage attributes.

S. No.	Strains	Height (cm)	Tiller No/ m. row	Leaf/Stem ratio	GFY[1] (Q/ha)	DMY2[2] (Q/ha)
1	JHO 801	91	120	0.491	118.0	28.98
2	JHO 802	79	102	0.701	91.3	25.40
3	JHO 810	87	145	0.421	287.3	69.91
4	JHO 815	84	99	0.549	189.3	49.17
5	JHO 819	99	107	0.519	136.6	27.72
6	Kent	102	108	0.615	192.3	47.06

[1] Grain forage yield
[2] Dry matter yield

FOUR SPIKELET TYPES OF AVENA IN VIEW OF THE PLOIDY

I. Nishiyama

This study follows "Differentiation of three grain-separation types of Avena in relation to the ploidy" which will soon be reported by Nishiyama and Morimoto. The spikelet of oats is mainly characterized by a combination of two pairs of major characteristics, hulled vs hull-less florets and separation vs nonseparation of florets. The following four spikelet types are found, four types in diploids and hexaploids, and three types in tetraploids without the naked type.

1. Wild type (abbreviation W type) as in A. fatua.
2. Subwild type (S type) as in A. sterilis.
3. Cultivated type (C type) as in A. sativa.
4. Naked type (N type) as in A. nuda. The grain is hull-less. The spikelet is always multiflorous and the rachilla segment is elongated.

The spikelet type, e.g. the W type of diploids, tetraploids and hexaploids is designated W_1, W_2, and W_3 type, respectively. It is available to the others.

Using 20 Avena species more than 90 reciprocal hybridizations were made and spikelet types of F_1 hybrids were carefully observed. Intermediate or incomplete dominant spikelets were classified into the dominant type. Some results were cited from literature. Recessive < dominance relationships among four spikelet types are summarized in relation to the ploidy as follows:

$$N_1 < C_{1,2} < W_{1,2} < S_{1,2} < W_3 < S_3 < C_3 < N_{(1)3}$$

That is, in 2x X 2x, 4x X 4x, and 2x X 4x, the dominance sequence was shown by a series of $N_1 < C_{1,2} < W_{1,2} < S_{1,2}$, without any relation to the ploidy. The 6x X 6x indicated another series of $W_3 < S_3 < C_3 < N_{(1)3}$ in which $N_{(1)3}$ was correctly epistatic to the other types as shown later. It is remarkable that if a hexaploid was used as one of the parents in the crosses (2x X 6x and 4x X 6x) the spikelet type of the hexaploid parent was always dominant. The S_1 type was not obtained by cross-over between the C_1 and W_1 type, because of $W_1 < S_1$. It might occur through dominant mutation from the W_1 type. The spikelet types of tetraploids might be just due to duplication of factors for those of diploids.

According to Nishiyama's (1951) nullisomic investigation the spikelet types, W_3, S_3 and C_3 are mainly due to the presence of a pair of chromosomes MK-9 (c designated previously) of the third genome of A. fatua, A. sterilis and A. sativa (A. byzantina) respectively. However, the chromosome MK-9 of A. nuda effects the C_3 type spikelet, and its homoeologous chromosome, probably of the first genome (A genome) controls the naked spikelet (abbreviation $N_{(1)3}$ type) being epistatic to the C_3 type. It is interesting that the N_1 and $N_{(1)3}$ type show the most extreme recessive and dominance, respectively, in the series of dominance sequence, though both of them exhibit the same phenotype. Anyhow it seems that genes for spikelet characters in hexaploids are different in the genetic nature from those of diploids or tetraploids though they affect similar phenotypes.

In general the spikelet characters are closely associated with pubescence on the basal scar and rachilla segments as well as partial awnedness. A few or no cross-overs were observed between these characters. These facts suggest that genes for all of the spikelet and associated characters are linked very closely or rather form a gene complex. In hexaploids many multiplications of the gene complex or rather a cluster of base pairs concerning the complex might occur in the DNA level, and show a genetic behavior as if one gene inheritance.

OATS IN MOROCCO

A. Bari

Oat production, which was unknown in the agricultural practice of Moroccan farmers, was introduced at the beginning of this century by a French colonist around 1915. At that time oats were mostly grown in the eastern part of Morocco. Production increased towards the center and finally, North, West and South, along the coastal areas of the Atlantic ocean. Oats were mainly grown as a grain crop for animal feeding.

Most of the oat material introduced from Europe either directly or indirectly from Algeria did not appear well-adapted. French colonist research workers utilized their experience in Algeria to produce more adapted and early maturing varieties from Mediterranean oats.

Improved grain yield was the ultimate objective of their work. Oat improvement was then established as a cereal crop program. Varieties were selected for earliness to avoid water deficiency occurring at the end of the growing season. All of these varieties were derived from Avena byzantina which has a low water requirement and good adjustment of its growth cycle to the Moroccan conditions. One variety, "Tutrice 153", was the exception. It was selected from a population resulting from a cross of Avena byzantina X Avena sativa in 1924.

After a few years of breeding, several varieties were available and then oat improvement received less emphasis until now. Studies were focused more on forage oat and forage oat-legume mixtures to define proper seeding rates, date of sowing and the influence of harvesting stage on dry matter yield. Oat disease effects and forage quality were less investigated.

At the present time, oats in Morocco occupy approximately 20.000* ha in pure stand and 75.000* in mixtures with vetch. (Total forage crop area is 273.000* ha). In general the decrease of the area sown to oats occurred since french colonists left Morocco. But recently the area sown to oats has increased again, mainly after the year of the 1981 drought. Farmers were convinced of the value of a forage crop in their cropping system and the oat crop is becoming very important as a component of livestock feeding. The use an annual forage crop therefore is becoming an integral part of cropping systems in non irrigated zones. One common thing in Moroccan cropping systems is that more resources are allocated for human food than animal production. Consequently, a drought year has a very severe effect on livestock production.

Among the varieties grown now, the variety "Tutrice 153" is the principal and only variety available to the farmers. It is a very old variety selected under Moroccan conditions. It is grown alone or in mixtures with vetch. Its only advantage in mixtures is its rigidity. Unfortunately it is not suitable for green forage production under all different agroclimatic zones of Morocco. It cannot be grown in the Northern part of Morocco because of the late

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*1983 (Direction Production Vegetale) Statistics

springtime rainfalls. Time of forage cutting and hay making concurs with unsuitable soil and climatic conditions. All these disadvantages severely restricted its area of production.

At the Central Station of Forage and Pasture Plant of the National Institute of Agricultural Research (I.N.R.A.-Rabat) we are engaged in the development of new varieties of oats.

Our program is concerned mainly with the development of new varieties for the Northern part of Morocco and in mountains and in regions receiving beneath 300-350 mm of the annual average rainfall.

The second most important objective of the oat improvement program is to develop more resistant varieties to:

- Puccinia coronata
- Puccinia graminis
- Helminthosporium sp.
- Powdery mildew, and
- Barley Yellow Dwarf Virus

The third objective in regard to agronomic characteristics is to develop more productive and suitable varieties for haylage according to the different agro-climatic zones of Morocco.

ARKANSAS

R. K. Bacon

Production: The number of acres of oats planted in Arkansas the past ten years (1974-83) has ranged from 85,000 acres to 45,000 acres. The general trend of declining acreage continued in the 1983-84 season with only 50,000 acres planted. Oat production continues to be centered in the Grand Prairie region in Southeast Arkansas. Extremely low temperatures during late December and early January resulted in widespread winterkill and the harvest of only 28,000 acres, the lowest ever recorded. Disease incidence was low, resulting in relatively high yields of 70 bu/A.

Research: The research program is primarily involved in breeding. Selection for crown rust resistance and winter-hardiness have resulted in elite lines for yield testing.

Personnel: R. K. Bacon assumed the responsibilities in small grains breeding after F. C. Collins left for a position with CR Seeds. J. P. Jones, small grains pathologist, will return to the program in April after completing a four-year assignment in Egypt.

Indiana

Purdue University. H. W. Ohm, F. L. Patterson, J. M. Hertel (Breeding, Genetics), J. E. Foster (Entomology), G. E. Shaner, G. C. Buechley (Pathology), R. M. Lister (Virology), K. M. Day and O. W. Luetkemeier (Variety Testing), and C. L. Harms (Extension).

Production: The production of oats in Indiana averaged 63.9 bushels per acre in 1984 harvested from 80,000 acres as reported by the Indiana Crop and Livestock Reporting Service. Noble, a barley yellow dwarf (BYD) tolerant variety constituted 50% of the harvested acres in Indiana. Ogle and Porter at 16.4% and 3.4%, respectively, make up the largest part of the acreage after Noble. BYD is a continual disease problem in Indiana on oats. Including Noble, approximately 81% of Indiana oats acreage is planted to BYD tolerant varieties.

Weather conditions in March and April were generally cold and wet in all of Indiana. This delayed the start of oat planting until May and made for overall poor growing conditions in our nurseries.

Research: Oats research at Purdue University involves development of resistance to BYD, crown rust and the combining of these resistances into high yielding types. Selection for disease resistance and high yielding types was not possible due to lateness and poor growing conditions.

We continued a recurrent selection program combining 8 winter oat lines (sent to us by Dr. M. E. McDaniel, Texas) and 8 spring oat lines. The population was infected in the greenhouse with the PAV isolate of BYDV and transplanted to the field. Plants were space-planted so that plants, and plants within rows, were 7 centimeters apart. The individual plants were selected for BYD-tolerance by visual inspection. These selected plants will be intercrossed twice more in the greenhouse and reselected in the field in 1985.

Observation of our advanced lines in hill plots for reaction to the RPV and PAV isolates of BYD continued although symptoms were hard to distinguish from environmental plant stress. Previous observations and research have indicated that cultivars will differ in their reaction to infection with these two isolates. We have also observed that an infection of both RPV and PAV on the same cultivvar causes severe symptom expression in even the most tolerant cultivars.

Personnel: Dr. Ohm is still on assignment in West Africa, but will return to oat and wheat improvement at Purdue in August, 1985.

David Baltenberger is beginning his Ph.D. research with BYD resistance.

Publications:

1. Day, K. M., G. E. Shaner, D. M. Huber, D. H. Scott, J. E. Foster. 1984. Performance of public and private small grain varieties in Indiana. Station Bulletin 454. Agr. Exp. Stn., Purdue University.

IOWA

K. J. Frey, M. D. Simons, R. K. Skrdla,
L. J. Michel, and G. A. Patrick

Iowa State University

About 750,000 acres of oats were harvested for grain in Iowa in 1984. Mean yield was 65 bu/acre, so the total production was between 45 and 50 million bushels. Oats were sown late in 1984. There was adequate moisture and moderate temperatures during plant development and grain filling. Thus, production was excellent, and test weights for oats in 1984 were the highest in many years. Neither crown rust nor yellow dwarf virus was of any importance to oat production in Iowa in 1984.

Ca. 8000 bushels of foundation seed of 'Webster' variety of oats was produced by the Committee for Agricultural Development in 1984. This foundation seed was offered to seed growers in Iowa and other midwestern states for the production of registered or certified seed in 1985. Webster continues to show good performance and test weight and its crown rust resistance seems to be the best among the oat varieties available in Iowa.

Several years ago (Murphy et al., Euphytica 30:33-40, 1982), we showed that a simulated multiline variety composed of five isolines from the multiline M73 group was not stable in isoline composition when propagated over four consecutive seasons. CI 9192 was significantly reduced in the mixture, indicating it was a poor competitor, whereas CI 9184 increased in the mixture, indicating it was a good competitor. The other three isolines maintained approximately the same percentages in the multiline over the four propagation generations. More recently, Dr. Bruce McBratney measured the competitive ability of these five isolines when planted in paired comparison. The results from this study were diametrical to those of the original one, i.e., CI 9184 was shown to be a poor competitor and CI 9192 a superior one. Thus, the use of competitive stands of only two genotypes at a time (such as the design used by McBratney) do not give the same measure of competitive ability as a completely mixed stand of many genotypes.

Recently, we have conducted a study on simultaneous selection for grain yield and protein percentage in populations of oats derived from interspecific matings of Avena sterilis x A. sativa using an "independent culling" procedure. With this procedure, one trait is selected first at some intensity and a sample of lines from the first selection is subjected to further selection for a second trait. In this study grain yield and protein percentages were selected at various independent culling levels to give final samples of 2% of the lines from the original population. Initial intense selection for grain yield resulted in samples of lines with high grain and protein yield but low protein percentage. Intense initial selection for protein percentage resulted in samples with high protein percentage but low grain and protein yields. Samples selected for protein yield only showed no significant difference from the recurrent

parent for any trait. The recommended regime for improving protein percentage and grain and protein yields simultaneously was one that initially selected from 25-50% of the original sample on the basis of protein percentage and then provided intense selection for grain yield in lines that remained. At least three backcrosses were necessary to obtain lines with high protein percentage and acceptable agronomic traits.

Several changes have occurred in the ISU oat project personnel during 1984. Bruce McBratney completed his Ph.D. degree; and Narimah Kairudin, Fred Rattunde, and Bryce Abel completed M.S. degrees. Dr. Bruce McBratney is now a wheat breeder with Pioneer HiBred International at Hutchinson, Kansas. Fred Rattunde, Narimah Kairudin, and Bryce Abel are continuing to study toward Ph.D. degrees. Fred is at the International Crops Research Institute at Hyderabad, India, conducting research for his Ph.D. dissertation. Narimah Kairudin and Bryce Abel are continuing their graduate work at Iowa State. New faces on the small grain project are Jim Lehmann from Iowa and Gary Atlin from Canada, who are studying for Ph.D. degrees.

MARYLAND

D.J. Sammons
University of Maryland

Production

Maryland farmers harvested a total of 15,000 acres of oats in 1984, an increase of about 1000 acres over the previous season. Statewide, oat yields averaged 57 bu/acre for a total state oat crop of 855,000 bushels. Oats are a relatively minor crop in Maryland. The involvement of the small grain breeding program with this crop is limited to variety testing, although no variety test was planted in 1984 because of an exceptionally wet spring.

The geographical location of Maryland makes it a transitional state in terms of oat production, although an important horse industry provides a strong market for the grain. There are environmental risks in the production of both winter and spring oats in the state. Winter oats are risky in most areas of the state except on the Eastern Shore because of the danger of winter kill. Spring oats are generally most successful in the western region of the state, but only if they are planted early enough (March) to mature before the excessive heat of early summer.

MINNESOTA

D.D. Stuthman, H.W. Rines, P.G. Rothman, L.L. Hardman, and R.D. Wilcoxson

Nearly 80 million bushels of oats, about 1% more than in 1983, were harvested from 1.2 million acres in Minnesota in 1984. The average yield was estimated at 65 bu/A, second best on record. The weather conditions, in contrast to 1983, were nearly ideal. Planting into soils with good moisture was timely. Temperature and moisture were very favorable through heading, resulting in a productive crop of high quality. In general, diseases had minimal impact, even though weather was also favorable for disease development.

Minnesota selection Mn 79229 was released to seed growers with the name Proat. It is described elsewhere in this Newsletter. We are also in the stage of final increase prior to release for Mn 80116. The anticipated release date is February, 1986. Finally, we will begin a small increase of Mn 81227 in 1985.

Dr. Uriel Maldonado, former director of CIAMEC in INIA for Mexico is spending a one-year sabbatical leave at the University of Minnesota. Upon his return to Mexico, he plans to take a more active role in the Mexican oat breeding program.

MISSOURI

Paul Rowoth, Dale Sechler (Columbia)
and C. Hoenschell (Mt. Vernon)

Production: The 1984 harvested oat acreage decreased by 39% from 1983. Acreage has been declining slightly. The decline in acreage is very closely related to the unfavorable soil conditions for seeding in very early spring for the last couple of years. This year the state had above normal rainfall and lower than normal temperatures causing a delay in seeding, in most parts of the state, until April. Growers know that, unless oats are seeded very early, the growing season in Missouri will be usually unfavorable for the production of acceptable grain yield and quality. They proceeded by seeding only 65,000 acres and harvested only 33,000 for grain at a yield of 48 bu/acre. Those acres not harvested for grain were pastured, cut for silage or used as a cover crop.

Disease: Barley yellow dwarf virus was the most damaging disease of oats statewide, but inoculation did not occur until late in the season resulting in small reduction of yield. Crown rust was the second most damaging disease, at a relative low infection rate.

Varieties: No one variety was outstanding in overall performance throughout the state as has occurred in the past. The top three varieties yielding the best over locations were Bates, Ogle and Larry. The unusual season seemed to bunch the maturity of the varieties together.

Personnel Changes:

Dr. Dale Sechler left on September 27, 1984 to take leave for two years to work on an AID program in Tunisia.

Dr. Neil Cowen arrived February 21, 1985 as Visiting Assistant Professor to supervise the Oat Breeding and Genetics Project.

NEBRASKA

John W. Schmidt and Thomas S. Payne
University of Nebraska

Oat seeding was much later than usual in Nebraska in 1984 because of excessive spring moisture. However, the moisture and cooler June-July temperatures allowed the oat crop to mature normally and produce a 15 million bushel crop. Average yield was 50 bu/a compared to the record yield of 58 bu/a in 1982. Harvested acreage (300,000) was the lowest since 1880. Ogle is, probably, the most widely-grown cultivar in Nebraska.

The only disease of note in our nurseries was stem rust. In the UEOPN all entries were susceptible while in the UMOPN only the Canadian and North Dakota entries were resistant--the resistance coming from Pg13. The stem rust came in too late to cause much damage.

NEW YORK

M. E. Sorrells and G. C. Bergstrom

1983 Spring Oat Production. The 1984 oat crop for New York State averaged 58 b/a on 180,000 acres. This is about the same as last year but both 1983 and 1984 were 8 b/a below 1982 yield. The yield reduction in 1984 was due to a very wet spring which resulted in late plantings. Ogle, Porter, and Astro are the most popular cultivars at the present. Diseases did not have a major impact on the yield of spring oats. Barley yellow dwarf virus was less prevelent than in recent years.

Introgression of Tetraploid and Diploid Avena Species. This USDA-funded project was set up to develop methods for utilization of unadapted and wild tetraploid and diploid *Avena* species through the formation of octoploid lines and gene pools and to assess the genetic potential of octoploids relative to parent lines for several agronomic traits.

In 1980 approximately 200 tetraploid accessions from the world collection were evaluated for agronomic traits and 30 were examined cytologically to verify their ploidy levels. Eleven were found to be hexaploid and one was diploid. A1, A2, and A3 progenies of five 4x/6x amphiploids grown in the field and greenhouse were selected twice for fertility and once for maturity and plant vigor. Approximately 300 A2 and A3 progenies within these five 4x/6x amphiploids were screened cytologically. A trial to measure the gain of specific agronomic characters due to selection was grown in 1982. A wide variety of selection criteria have been tested for identifying octoploid individuals in the 4x/6x amphiploid progenies, including seedling vigor, biological yield, grain yield, harvest index, leaf guard cell size, pollen size, and pollen viability. None of these criterion have been effective for rapid identification of octoploids. Because of unusually large variances among families within progenies, changes in means due to selection were not statistically significant. The reason for the lack of suitable selection criteria is likely to be chromosome instability in the individual plants. Cytological studies of root tip cells show somatic chromosome instability. This leads to non-heritable variation and a high degree of genetic diversity in the segregating progenies. After two cycles of selection, the population mean chromosome number fell from 70 to 57, very close to the octoploid number of 2n=56. Of the progenies screened cytologically, 17 individuals were identified as octoploid or near-octoploid and as having good fertility and plant type. Progenies of these selections were intermated in the spring of 1984, but did not produce viable hybrid seed.

In 1982, 115 A1 plants of eight additional 4x/6x amphiploids were evaluated in the field. Twenty-nine A2 families derived from the above A1's, and 121 A3 families selected from these A2's were grown in pedigree nurseries in 1983 and 1984. Plants were selected on the basis of harvest index and/or seed weight. Over 1000 A2 and A3 plants were evaluated for heading date, biological yield, seed weight, and harvest index in the two years. Progenies were highly variable. Significant differences between crosses were observed for biological yield in 1983 and harvest index in 1984. Significant differences between families within a cross and between families among crosses were observed for height, biological yield, seed weight, and harvest index in 1983 and height, heading date, and harvest index in 1984. Means ranged from 2.24 - 20.44 grams per plant for biological yield and 0 - 3.95 grams for seed weight. Mean harvest index (the ratio of seed weight to biological yield) ranged from 0.01-0.32.

In 1984, bulked populations of two 4x/6x amphiploids were selected into three fractions based on seed size and density with a gravity table. The seed size and density treatments were significantly different at the .05 level for biological yield and harvest index, and at the .01 level for seed weight and chromosome number. Crosses were significantly different at the .01 level for chromosome number. The two crosses and the cross x treatment interactions were not significantly different for the agronomic traits. Plants grown from the heavy seed fraction produced more biological yield and seed than the control or small seed fractions. Chromosome number averaged 59 and 52 for the heavy and light fractions, respectively. The cross PI 330494/Ro720183 had a higher chromosome number (58) than did cross PI 330494/Coker 227 (52). These results suggest that the gravity table may prove useful for selecting improved genotypes from this material.

In selecting diploids as parents in 2x/6x crosses, we have screened 200 accessions from the world collection for plant type. Selected accessions were examined cytologically for chromosome number. Obtaining 2x/6x hybrids has proven quite difficult. Out of about 5000 crosses, 10 plants have been recovered from culture, however only 4 hybrids were identified. To date, chromosomes of three of these hybrids have been doubled with colchicine and agronomic and cytological studies have been carried out on A1, A2, and A3 progenies. Cytological studies of root tip cells indicate somatic instability, while meiotic analysis indicate pairing is primarily as bivalents, but 1-3 trivalents, 1-3 quadrivalents, and up to seven univalents can occur at metaphase I. Lagging chromosomes and micronuclei are common in microsporocytes. Aneuploid gametes do not function as evidenced by the octoploid chromosome number being maintained in some somatic cells of the progeny.

For the purpose of evaluating genetic potential, several octoploid lines were obtained from other investigators. Six 2x/6x octoploids and their hexaploid parents were obtained from Dr. H. Thomas and Mr. M. Leggett (Welsh Plant Breeding Station). Also, four 4x/6x octoploids were obtained from the world small grains collection. These were developed by Dr. I. Nishiyama (Japan) and the original parents were not available. The maturity of the octoploids was similar to the hexaploid parents with the exception of the *A. canariensis / A. sativa* octoploid which headed about one week earlier. A combined three year analysis indicated 2x/6x octoploids yielded significantly more grain than 4x/6x octoploids, but yielded less than 6x checks. The best 2x/6x octoploids were *A. longiglumis / A. sativa* and *A. canariensis / A. sativa*, yielding 12% and 25% below the 6x mean. Though yielding less than the average 6x, the *A. longiglumis / A. sativa* octoploid yielded significantly higher than Orbit in 1983, and outyielded Astro and its 6x parent -Sun II - by 350 kg/ha in 1984. The rest of the octoploids averaged 38% lower yield. Octoploid test weights were about 15% below the 6x checks. Highly significant G, E, and GxE interactions were observed over the three years. Stability parameters calculated over environments for yield indicate two genotypes which yielded over 2 t/ha were stable over environments.

In general, the octoploids obtained from other researchers performed very well in comparison to commercially recommended cultivars. Preliminary agronomic data on the three additional 2x/6x amphiploids suggest that they may also yield well. This level of performance is unexpected in view of the very weedy habit of the wild species. The exceptional vigor and similarity to agronomic type suggests that there are favorable allelic interactions between the alien and the cultivated oat genomes.

Diploid/hexaploid derived octoploids were intermated in the spring of 1984. Ten successful hybridizations have been made. These crosses represent the raw material for selection of genotypes with improved plant type, chromosome stability, and better balanced developmental pathways resulting from genetic recombination. Sue E. Fritz is currently consolidating the genetic stocks she has developed for this project. They will be released to oat breeders and geneticists for use in their breeding programs. Publications are in preparation.

Screening Techniques for Improvement of Oat Milling Quality. Our first season of experiments comparing three different mass selection techniques for oat milling quality was completed. Bulk populations were selected by aspiration, a gravity table, and a gravity table with a seed polishing pre-treatment. Aspiration and the gravity table coupled with the pre-treatment produced significant improvement in groat percentage in selected populations; the gravity table alone was less effective. Selection also had significant effects on plot yields and seed test weight. Three F3 populations were also selected and advanced one generation during the growing season and have been selected again and advanced in the winter greenhouse for this year's trials.

NORTH CAROLINA

Ronald E. Jarrett and J. Paul Murphy

Growing Season

The 1983-84 growing season was excellent for growing oats. Planting was not delayed as in previous years. Topdressing of oats and application of herbicides for weed control were delayed because of wet field conditions. Precipitation was above normal, but because of extreme cold temperatures during winter and prevailing winds which reduced humidity, diseases were not a major problem. The cool temperatures (60-70 degrees) during late spring were ideal for grain filling. Harvesting was often interrupted by late afternoon showers.

Production

There were 140,000 acres of oats planted in North Carolina. Over one-half of the acreage (72,000) was grown for cover crops, hay, silage, etc., while the remaining 68,000 acres (3% decrease from 1983) were harvested for grain. Most of the acreage was planted with the varieties Brooks and Coker 716. Production was 3.9 million bushels, the same as in 1983. The average yield per acre was 58 bushels as compared to 56 bushels per acre in 1983. The value of grain production was $8.1 million while the total value of the entire crop was approximately $16.6 million.

Performance of Breeding Lines

The cultivars Coker 716 and Madison continue to dominate in the Coastal Plains Region in both 1983-84 and multiyear official state yield tests. In the Piedmont Region Coker 716 is the dominate cultivar followed by Brooks and Madison. The experimental line NC 79-5 exhibited exceptional test weight in state and Uniform Nursery Trials in 1984 averaging 39 lb/bu at Athens, Ga. However, its questionable winterhardiness resulted in its elimination for further testing.

Problem Areas

The main problems continue to be winterhardiness, diseases, insects and competition. Many oats suffer winterkill particularly in western North Carolina (Piedmont and Mountains). The main disease problems are barley yellow dwarf virus (BYDV) and crown rust. The cereal leaf beetle continues to spread over the entire state. In addition, interest in doublecropping with wheat, pursuing maximum yields or conducting intensive management practices with wheat, competes heavily and prevent any major increases in oat acreages.

Personnel Changes

Paul Murphy, Assistant Professor of Crop Science, assumed the small grain breeding position vacated by Dr. Charles Murphy who has moved to the National Program Staff, USDA, Beltsville, Md.

NORTH DAKOTA

Michael S. McMullen and H. A. Fisher

Production:

According to the North Dakota Crop and Livestock Reporting Service, 1,150,000 acres of oats were planted and 980,000 acres harvested during the 1984 crop year. This represents a 350,000 and 280,000 acre reduction for planted and harvested acres respectively relative to 1983. The average yield per harvested acre was 51.0 bushels which is 6.3 bushels per acre higher than the 5 year average. Total oat production in North Dakota was 49,980,000 bushels which is a 13,650,000 bushel decrease relative to 1983.

Diseases:

Dry conditions during the later portion of the growing season did not encourage development of stem and crown rust. Barley Yellow Dwarf Virus infection was less than has been observed in recent years.

Breeding Program:

ND78376 was released as 'Steele' which was described in the 1983 Oat Newsletter. Steele was increased by certified seed growers on 463 acres in 1984 in North Dakota.

OHIO

R.W. Gooding and H.N. Lafever

Production: According to the Ohio Crop Reporting Service, 220,000 acres of oats were harvested in Ohio in 1984. This was nearly 100% of planted acres. Yield per acre averaged 60 bu. for a total production of 13.2 million bushels in the state. Harvested acres and yields were down from 1983 levels by 20,000 acres and 4 bu. per acre, respectively. This was in most part due to a cool, wet spring which resulted in poor field conditions that delayed planting for many growers until late May or early June. Many other growers were forced by the lateness of the season to forego planting oats altogether and instead plant soybeans or corn for silage.

Varieties: Based on acres of Certified class seed produced, 'Ogle' was the most popular variety grown in Ohio in 1984. The variety 'Noble' was the second most popular. 'Porter' although far behind 'Ogle' and 'Noble' in the number of Certified class acres produced, seems to be gaining in popularity.

Breeding Program: As of July 1, 1984, a new oat breeding program was initiated in Ohio. Thanks to the generosity of many oat workers in the U.S. and Canada, we received 293 bulk populations and breeding lines to include in our crossing and selection blocks in 1984. Next season, in addition to our variety evaluation nurseries and regional nuseries, we will have over 4,000 panicle rows to evaluate as well as selection blocks and F_2 populations out of crosses made in the greenhouse during the winter of 1983-84. Our overall objectives are to encourage and improve oat production in Ohio. More specifically, we will develop new cultivars with increased yield potential for production in Ohio and surrounding states by increasing yield per se, adaptability, disease resistance, protein content and straw strength. We will pay special attention to BYDV resistance, by far the most serious oat disease in Ohio.

SOUTH DAKOTA

D.L. Reeves and Lon Hall

Production: Yield per acre in 1984 was the second highest on record with an average yield of 56 bushels per acre. This is only the forth time the state average has exceeded 50 bushels per acre. Our highest average yield was 60 bushels per acre in 1982. Production was 86,800,000 bushels, an increase of 10% over the previous year.

Only 1.7 million acres of oats were planted in 1984. This decrease was due largely to a very wet and late spring. Many growers considered it too late to plant oats when they could get in the fields. This was the smallest planted acreage in 60 years. The closest year was 1938 when 1,744,000 acres were planted. The 1984 oat acreage was only 84% of the previous 10 year average. In spite of the very low acreage, the production was over 97% of the average of these years.

Growing conditions were better than expected for late planting. Moisture was good throughout the season and temperatures moderate. A small amount of leaf rust was present in the eastern part of the state.

Oat Varieties: The 1984 survey of varieties shows Burnett remains the most widely grown oat in the state being planted on 47% of the acreage. Burnett is the most popular variety in all crop districts except for the northeast and southwest. Moore was planted on 7.7% of the states acreage and was the most popular variety in the northeast where it was on almost 30% of the acreage. In the east central district, Moore was on 10% of the acreage. On a statewide basis, Nodaway 70 was almost equal to Moore. Nodaway 70 was most popular in the southwest district where it was on 43% of the acreage. In the east central it was on 14% and in the northeast on 13%. Lancer ranked 4th being on about 4% of the acreage. It was most popular in the southwest and northeast. The only other varieties constituting over 2% of the oats were Benson and Lyon.

Research: This project works primarily with varietal development and production related factors. We are continuing to emphasize plump white kernels. The importance of this 'eye appeal' is noted when looking at the two leading varieties which are white hulled and are consistently high in test weight.

Jack Ingemansen has completed his M.S. degree. His studies were on insects found in farm stored oats. Moisture percent of the oats in the bin rose an average of one percent from August through March when sampled with a standard probe. The average insect density remained constant from 8 to 12% moisture. Oats stored below 12% did not eliminate infestations because some species were adaptable to dry grain. Below 12% moisture the average insect density was quite low. Above 12% the average insect density increased as moisture percent increased. Insects found included sawedtooth grain beetle, foreign grain beetle, hairy fungus beetle and *Cryptolestes spp*.

TEXAS

M.E. McDaniel, J.H. Gardenhire, David S. Marshall, L.R. Nelson,
K.B. Porter, David Worrall, E.C. Gilmore, James Mulkey,
Lucas Reyes, Earl Burnett, and C.A. Erickson

The 1983-84 crop season was not favorable for oat research in Texas; the crop season also was disastrous for oat grain producers and for livestock operations dependent on oat forage. Following a relatively mild fall in which little winterhardening had occurred, the "Siberian Express", an extremely cold blast of Arctic air, arrived December 21, 1983. All-time record cold temperatures (both minimum readings and duration of sub-freezing weather) during the Christmas season killed or severely damaged most of the Texas oat crop north of San Antonio. Only 16.7% of the state's planted oat acreage of 1.5 million acres was harvested for grain, and the average commercial production fell to 35 bushels per acre compared to the all-time high of 48 bushels per acre set in 1983. Oat nurseries at Bushland, Chillicothe-Vernon, and Dallas were totally destroyed by the freeze; over 50% of all entries at Temple and McGregor were killed or suffered serious stand losses. Survival was good on almost all entries at Uvalde, and winter injury was very minor at Beeville. At College Station, the nursery was planted in mid-December due to wet field conditions, and escaped serious injury because emergence was delayed until after the severe freeze. Yields at College Station averaged over 110 bushels per acre, with top entries producing over 140 bushel yields. Entries having acceptable winter survival produced 70-90 bushel yields at McGregor and 90-110 bushel yields at Temple. Yields at Uvalde (irrigated) averaged over 150 bushesl per acre, with top entries reaching the 200 bushel level. Yields at Beeville were limited by spring drought stress, and averaged 70 bushels. As in the 1983 season, both crown rust and stem rust were very light, preventing definitive selection for resistance in segregating populations. Crown rust cultures exhibiting "full" virulence on all "Coker" varieties grown in Texas were again seen at College Station in 1984. Although the infection was light and damage was negligible in 1984, this new race poses a serious threat to oat production in Texas, as the Coker varieties occupy a large acreage. The evolution of the "Coker" crown rust race does not appear to fit the pattern usually observed when new races appear. The new race appears to be more-or-less "fully" virulent on all Coker varieties currently grown in Texas, but Marr Simons has found that it is avirulent on some older varieties, including Appler. Therefore, it does not appear that this new race developed by "adding" new virulence to any of the crown rust races which have been prevalent in recent years.

Serious freeze losses in oats also have occurred during the current season. At College Station, St. Augustinegrass and Zoysia lawns remained green through the 2nd week in January, with temperatures in the mid 80's during that week. The temperature fell to a low of 13^{0}F the following week, and most oats and some of the less winterhardy wheats were killed or severely damaged. Seedsmen are worried that Texas growers will not want to produce seed oats next year since winterkilling losses have been so severe for two successive seasons. H-833 (a Coker variety marketed exclusively by the Harpool Seed Co., Denton, TX), and the Arkansas variety, Nora, have exhibited the best cold "shock" resistance of entries in the 1984 and 1985 Central Texas oat tests in which good differential winter damage has occurred.

Personnel: Dr. J.H. (Bud) Gardenhire retired in August, 1984, after a long and productive career as a small grains breeder at Texas Agricultural Experiment Station units at Denton and Dallas. Dr. David S. Marshall has been appointed Assistant Professor in Small Grain Pathology at the Texas A&M University Agricultural Research and Extension Center at Dallas. Dr. Marshall holds the M.S. degree from Louisiana State University, and the Ph.D. degree from Purdue University. He had been employed by North American Plant Breeders (NAPB) for 2 1/2 years before accepting the TAES position at Dallas.

U T A H

R. S. Albrechtsen
Utah State University

Production: Cold, wet spring weather seems to have become the normal rather than the exception for Utah, as we experienced our third consecutive year of such conditions in 1984. The spring grains started out with a handicap because of the late planting date resulting from such conditions. However, a good supply of irrigation water and other favorable growing conditions over most of the State resulted in a reasonably good harvest of most crops and a good state-average oat yield.

The usual oat diseases were noted in 1984, but losses were generally light. Our losses from diseases are usually minimal.

The Cereal Leaf Beetle was observed in Utah during 1984. Although this was the first year the insect had been noted, it was obvious that it must have been present for some time previously, since infestations were heavy in some areas and injury was severe in those areas. Lighter infestations and suspected feeding injury were noted in other areas as well.

Oat Program: Utah's oat acreage is small and we do not attempt to carry on a full-scale breeding program. However, oats do occupy an important position in our agricultural program and production will likely continue near its present level. Improved cultivars are identified from entries in the Uniform Northwestern States Oat Nursery and from other sources through cooperative efforts with other breeders.

WASHINGTON

C. F. Konzak
Department of Agronomy and Soils
Washington State University

Washington has elected to join Idaho, Montana, and the USDA in the joint release of 75Ab1170 oat, named Monida. Monida has consistently yielded just under Cayuse and Appaloosa but has produced white hulled grain of significantly higher test weight. The test weight difference is often 2-3 lb/bu. Monida should find wide use by growers currently using Park because of its high test weight and white hulls.

While oat breeding at Washington State University never was extensive, that effort was terminated in 1982 because of budget and time constraints and the relatively low acreage. Testing of oats developed elsewhere will continue, however, as oats are still important for forage, as nurse crop for legumes, and as grain in animal foods.

WISCONSIN

M. A. Brinkman, R. A. Forsberg, R. D. Duerst, E. S. Oplinger
H. L. Shands, D. M. Peterson, J. B. Stevens, and K. D. Gilchrist
(Agronomy) and D. C. Arny and C. R. Grau (Plant Pathology)

Production, Diseases, and Varieties

Wisconsin farmers planted approximately 1,020,000 acres of oats in 1984 and harvested approximately 840,000 acres for grain and straw. The statewide average grain yield was estimated at 64 bu/a, up 11 bu/a from the 1983 average and 7 bu/a higher than the average for the 1978-82 growing seasons. Wisconsin ranked third in oats production in 1984. Most of the acreage that was not harvested for grain and straw was harvested as oatlage between mid-boot and heading. An increasing number of Wisconsin dairy farmers who are harvesting their oats as oatlage are mixing field peas with oats at planting time. The peas are added to improve both quality (protein percentage) and quantity of harvested forage. A common practice is to seed oats at about 2 bu/a, peas at 1 bu/a, and underseed with alfalfa at the same time. In most areas of the state farmers who harvested oatlage or pea/oatlage mixtures also harvested a good crop of alfalfa in late August or early September in 1984.

Although cool, wet weather delayed oat planting until May in many areas of Wisconsin, very good to excellent conditions during the growing season resulted in high yields of grain and straw. Reports of 90 to 110 bu/a grain yields were common in many areas of the state. Favorable distribution of rainfall and cool nights throughout much of the growing season contributed to these high yields. Leaf and stem rust, barley yellow dwarf virus, leaf and stem Septoria, loose smut and leaf blotch (Helminthosporium avenae) were prevalent in at least some areas of the state in 1984, with leaf rust and BYDV causing the most damage. In total, yield losses due to diseases were less than 5% in 1984.

Stem rust was more prevalent in the Madison oat nursery in 1984 than in recent years. Testing of samples submitted to the USDA Cereal Rust Laboratory at St. Paul, Minnesota identified one race of stem rust as NA-27. Another race, thought to be one or possibly two derivatives of NA-13, was also present in the Madison nursery.

The new Wisconsin variety Centennial was grown on farms throughout the state for the first time in 1984, and it performed very well. Centennial is midseason in maturity, has an attractive, productive-looking panicle, and is resistant to leaf and stem rust. Grain yields and bushel weights were very good to excellent in 1984. Dal continues to be a popular variety in some areas of the state. Ogle and Porter are also performing quite well in Wisconsin. There were reports of an unusual amount of blasting in panicles of Ogle in several areas of the state. This may have been caused by several unusually cool nights between spikelet initiation and jointing.

South American Oat Nursery

There were 245 test lines (pure lines) and 90 segregating populations (F_3 generation) in the Quaker nurseries grown throughout South and North America. M. A. Brinkman, M. E. McDaniel (Texas A and M University) and S. H. Weaver (Quaker Oats, Chicago) visited nurseries in Brazil, Uruguay, Argentina, and Chile in November, 1984. The oat acreage has increased in these countries in recent years. In general, the oats in most of the areas visited looked good in 1984. The ME1563 and CI9221 sources of crown and stem rust resistance appeared to be holding up very well in all nurseries. Barley yellow dwarf virus was prevalent in the nurseries at Castelar and Bordenave in Argentina.

CEREAL CROPS RESEARCH UNIT

Dr. Rob Welch has completed a study of the effects of oat bran and its fractions on cholesterol levels in chickens. He found that incorporation of the bran at 40% into purified diets markedly lowered serum cholesterol, and several fractions were active at equivalent levels. Rob has returned to his post at the Welsh Plant Breeding Station.

Dr. David Peterson is studying the changes in carbohydrate fractions in oats during maturation. Also, he is developing electrophoretic techniques to identify oat cultivars.

Dr. Pat Unkefer resigned her position in August, and a replacement is being sought.

THESIS RESEARCH PROJECTS

Transfer of Oat Stem Rust Resistance Gene Pg-16 From Tetraploid Avena barbata Pott. to Hexaploid Avena sativa L.:

Dr. P. Douglas Brown completed his Ph.D. program in 1984. His thesis research dealt with the transfer of stem rust resistance gene Pg-16, found in tetraploid (2n=28) A. barbata D203, to A. sativa. This gene conditions resistance to all stem rust races currently in North America. Lack of chromosome homology and pairing makes the gene transfer difficult to achieve. Dr. Brown utilized monosomic alien substitution, disomic alien substitution, and disomic alien addition lines, in conjunction with gamma ray irradiation to induce translocations and facilitate gene transfer. Several journal manuscripts are in preparation.

Oat Smut Inheritance (Mr. Donald T. Caine):

Mr. Donald Caine, a specialist with Dr. Deane C. Arny in the Department of Plant Pathology, has completed his M.S. thesis research and is now employed by Del Monte in DeKalb, Illinois. Mr. Caine's thesis research dealt with inheritance patterns in progenies from crosses among oat varieties and selections resistant or susceptible to current races of oat smut.

Oat Plant Morphology Study (Mr. Ronald A. Bunch):

Vigorous, leafy, productive-appearing oat plants often produce hully, unattractive kernels. Mr. Bunch is studying the relationship between dry weight of vegetative plant parts (leaves and culms) and groat percent. Preliminary observations on a diverse set of materials in 1983 revealed a low but significant negative correlation between groat percent and weight of the flag leaf. A highly significant negative correlation existed between groat percent and hull weight, while a nonsignificant, positive correlation occurred between groat percent and groat weight. Nonsignificant negative correlations existed between groat percent and vegetative weight, number of kernels per panicle, seed yield, and primary kernel weight. The negative relationship between vegetative weight and groat percent on a per culm basis ($r = -0.26$) approached significance. Three experiments were conducted in 1984, and measurement data on harvested plants are being obtained.

Genetic Studies--Oat Crown (Leaf) Rust (M. A. Moustafa):

Crosses between crown rust resistant Wisconsin translocation lines and A. sativa result in conventional 3R:1S and/or unconventional 1R:1S F_2 segregation ratios. Mr. Moustafa has initiated studies to elucidate causes of the abnormal gene-transfer frequencies, including examination of chromosome pairing, pollen development, and gene transmission through both the egg and pollen.

Performance of Backcross Lines Derived from Avena fatua:

Mr. Jim Stevens continued his agronomic and kernel quality evaluations on a series of backcross lines derived from A. fatua. A. sativa recurrent parents of the backcross lines are Dal, Stout, and a plump-kerneled line designated X2078-1. Nurseries were grown at Arlington and Madison in 1984. As in 1983, several backcross lines compared favorably with their respective recurrent parent, but genotype x year interactions appear to be large for some traits. Lack of leaf rust resistance and weak straw are primary deficiencies of many of the backcross lines in the study.

Drought Tolerance in Oats:

Mr. Baldwin Miranda completed his M.S. studies on drought tolerance in oats in 1984. Drought tolerance traits, especially leaf water conductance, were evaluated in a number of varieties and in F_2-derived lines from four oat crosses that had Hudson as a common parent. There were significant differences among varieties for traits such as stomatal concentration, guard cell length, and leaf water conductance. However, in the F_2-derived lines low leaf water conductance was not associated with high grain yields of hill plots grown under moisture stress conditions at Hancock, Wisconsin.

Inheritance and Heritability of Early Heading:

Doris Sabelka completed her M.S. studies on early heading in oats in January of 1985. Three sources of earliness, two of which were developed at Wisconsin in the early 1970's, were crossed with midseason and late genotypes that were high yielding and well adapted to Wisconsin growing seasons. Degree of dominance, skewness values, minimum number of factor pairs and narrow-sense heritability were evaluated. Results of the study will be submitted for publication.

Post Heading Growth Rate in Oats:

Mr. Abduljabbar Salman is evaluating post heading growth rate in oats. This work was initiated after the Ph.D. research of Dr. Yeong D. Rho showed that Stout oats accumulated substantially more dry matter after heading than Marathon and Lodi in medium to high N fertility conditions. Mr. Salman's research consists primarily of two studies. In one study, 15 oat varieties will be evaluated for post heading growth rate and other traits such as pre-heading growth rate, heading date, height, grain yield, straw yield, and yield components. The other study will evaluate the inheritance of post heading growth rate in progenies of Stout X Marathon and Stout X Lodi crosses.

NEW CULTIVARS

ANVIL

G.M. Wright

Anvil is being released by Crop Research Division, Lincoln, for feed grain production in Canterbury. In a limited number of trials over four seasons it has outyielded Omihi by 10%, and its grain quality is superior. It has adequate tolerance to the main oat diseases in Canterbury. It is not recommended for North Island use because there its resistance to rusts is inadequate, nor for Southland because no yield advantage over Makuru has been found in that region.

It was selected from the cross 144,01/Maris Quest//185,01-3, incorporating two selections that had reached the stage of advanced yield trials:

144,01 was from S172/Royal Scot//Milford/Pendek

185,01-3 was from Milford/Rodney//Avon and was a sister line of Ohau and Omihi, the most recent releases from our programme.

DESCRIPTION

Anvil is a medium-tall, medium-early white spring oat, similar in many respects to Makuru, which is the main milling oat in New Zealand. It is between Makuru and Omihi, the lead oat in Canterbury, in time of panicle emergence, height, and panicle density. It has some tolerance to crown rust and stem rust, and is similar to Omihi in showing good tolerance to barley yellow dwarf. It is resistant to lodging, straw break, and shaking. The secondary grains are rather small, and bushel weight only medium, but the groat percentage is high.

BUNDALONG

J. B. Brouwer

Bundalong is a grain oat released by the Department of Agriculture, Victoria, Australia, for the higher rainfall regions of that State. It was tested from 1979 to 1983 and has demonstrated substantial yield advantages over the varieties Bulban, Barmah and Swan in the north-central, Wimmera and north-eastern regions. Bundalong also yields slightly better than Bulban and Barmah in the south-west. For an accurate assessment of yield potential without losses due to grain shedding, the practice of windrowing common in south-western Victoria, was adopted in trials, and the results indicate that yields of Bundalong in that region are 24 per cent higher than of Swan. Bundalong will not be recommended for north-western Victoria where early maturing varieties are favoured.

Bundalong is named after a parish in north-eastern Victoria, and was developed from a cross between Avon and Cayuse. It is a mid-season oat of earlier maturity and shorter plant stature than Bulban and has good resistance to grain shedding.

Bundalong produces an attractive dark creamy grain of a quality comparable to that of Bulban. The 1,000 grain weight, test weight and protein content of Bundalong are slightly lower, but kernel percentage and oil content are slightly higher.

Bundalong is primarily intended as a grain variety, but when used for winter forage production, it has a higher dry matter yield than other grain types such as Bulban, Barmah, Swan or West. If sown for the dual purpose of winter herbage and grain, Bundalong would be best suited to later sowings (May) in Victoria, and limited grazing. Its hay production is variable.

Bundalong is similar to Bulban in its tolerance to barley yellow dwarf virus and is moderately susceptible to oat stem rust and oat crown rust. It may possess one specific gene (Pg-4) for resistance to stem rust.

MURRAY

R.J. McLean and P.A. Portmann

Murray is a new oat cultivar released by the Western Australian Department of Agriculture. The cultivar was selected from the cross Fulmark/Newton// Swan (66Q01-44)/3/(XBVT183)Kent/Ballidu(M127)//Curt made in 1972, and was field tested initially as 72Q016-15-7, and later as 72Q/137.

Murray flowers approximately 4 days before West. It is shorter than West (on average by 6 cm), which is a disadvantage for low rainfall areas. Straw strength is similar to West and Murray shows very vigorous early growth. Murray yields well over a range of soil types and times of sowing, and is better adapted to later sowings than most cultivars.

Trials in Western Australia indicate that Murray has a grain yield advantage over other oat cultivars in the medium (325-450 mm) and low ($<$325 mm) rainfall zones in particular. Murray outyields Mortlock and West by 5% and 11% and by 13% and 13% in the medium and low rainfall zones respectively.

Murray is a good quality oat with slightly better milling quality than West. Although it has darker grain colour than West, Murray has better hectolitre weight, grain plumpness and groat weight, and similar groat percentage. For feeding purposes the quality of Murray may be slightly lower than that of West, due to its lower nitrogen content.

Tests by J.D. Oates at Sydney University indicate that Murray contains genes Pg1 and Pg3 for resistance and stem rust.

Murray was bulked up in 1984 and has been released to farmers in 1985.

PROAT

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

'Proat' is an ivory-seeded late-midseason spring oat developed cooperatively by the Minnesota Agricultural Experiment Station and USDA-ARS and released in 1985. It was selected from the cross Dal/Lyon. A single F_2 plant was increased an an F_3 row in 1975 and seed from a panicle was grown in a hill plot protein nursery. This plot was bulk harvested and formed the basis of Mn 79229. Replicated yield testing was initiated in 1978. In 1982, approximately 1/2 of 600 progeny rows were harvested to constitute the lot of breeders' seed for Mn 79229.

Proat has been tested in Minnesota statewide trials for five years, 1980-84. It yielded more protein per acre than any other cultivar tested in Minnesota during that time. Its protein yield and bushel weight exceeded that of all named entries in the two years that it was tested in the Uniform Midseason Oat Performance Nursery (UMOPN) during 1981-82 (21 regional tests). In Minnesota it has yielded better than Lyon but below Moore and Ogle. It had the highest groat protein percent in Minnesota and was second only to Dal in the 1981-82 UMOPN. It is about equal to Moore in height with slightly better lodging resistance. Bushel weight and groat percent are equivalent to Moore. It has good resistance to crown rust and to smut in Minnesota and Wisconsin tests.

We believe that the high protein yield of Proat will make it especially useful to oat producers who feed their production. The high bushel weight of the variety will also be of interest to oat millers.

VITAL

Bengt Mattsson

Vital is a new cultivar from Svalof AB, Sweden. It was derived from the cross Sang x Selma and the line was first selected in 1973.

Vital is outyielding all the other cultivars on the market. During a five year period in official trials the yield of Vital exceeded Selma by 3%, Sang by 5% and Svea by 6%. Vital seems to be adaptable to different regions of the south and middle of Sweden.

Vital is at least as strawstiff as Sang, which has the most excellent straw quality so far. Vital is about 5 cm shorter than Selma and Sang.

The quality of Vital is higher than that of Selma, but somewhat lower than Sang and Svea. The seed size is between Sang and Svea and equal to Selma.

Vital was granted Plant Breeders Rights in 1983 and added to the official Swedish List of Cultivars in 1984.

WINJARDIE

R.J. McLean and P.A. Portmann

Winjardie is a new oat cultivar released by the Western Australian Department of Agriculture. The cultivar was selected from the cross Fulmark/Newton//Swan (66Q01-44)/3/(XBVT183)Kent/Ballidu(M127)//Curt made in 1972, and was field tested initially as 72Q016-06-48, and late as 72Q/146.

Winjardie flowers approximately 4 days later than West. It is slightly shorter than West with similar straw strength and early growth vigour. Winjardie yields well over most soil types, except the clay loam category, and shows particular adaptation to early sowing.

Trials in Western Australia indicate that Winjardie has a grain yield advantage over other oat cultivars in the north/central region of the agricultural area across all rainfall zones. Winjardie outyields Mortlock and West by 11% and 18% respectively in the north/central zone.

Winjardie is considered a moderately good quality oat. Compared with West, Winjardie has slightly lower hectolitre weight, groat percentage and nitrogen content, but similar groat weight and slightly plumper grain.

Tests by J.D. Oates at Sydney University indicate that Winjardie contains only the gene Pg2 for stem rust resistance.

Winjardie was bulked up in 1984 and has been released to farmers in 1985.

NATIONAL OAT COLLECTION

M. C. MACKAY

As part of a move to develop an Australian network of plant genetic resource centres the Australian Wheat Collection is being expanded to facilitate the inclusion of oat, barley and rye collections. The new centre will be called the Winter Cereals Collection.

The facilities at the Winter Cereals Collection will include two $40m^3$ seed storage rooms operating -18°C, a low temperature drying room (15° and 15% RH), a preparation room (15° and 15% RH), laboratory, quarantine area and offices. Current staffing includes the curator, two technicians and a secretary/typist. A further two technical staff are anticipated in the near future.

The oat collection will initially be established from material held by four breeding programs. This material will be field grown to obtain fresh seed, detect or confirm duplicates and collect morphological and agronomic data. It is anticipated that this material will be in long-term cold storage by 1987/88.

From early 1985 the Collection will begin introducing material on request for local oat workers. Australian quarantine regulations require oats to be grown for one generation under glasshouse conditions.

The Collection will use descriptors currently being developed by the International Board for Plant Genetic Resources (IBPGR), and will hold both 'base' and 'working' collections as defined by IBPGR, although the base collection may not be recognized as an IBPGR designated base collection.

All information collected will be stored in a database and listings of accessions will be available on microfiche once the collection is established (approximately 1988). At this time material will also be available on request to any bona fide oat worker in the world.

Below is a listing of oat cultivars registered in Australia in the last ten years together with pedigrees.

Name	Pedigree	State
West	Kent/Ballidu (M127)//Radar 2	W.A. (1975)
Esk	Blythe/Avon	TAS (1975)
Sual	Algerian 09/Minn. A.G. 331 0615//4* Yates Algerian 0751/3/Algerian 09/Santa FE CI7006 0585//4* Yates Algerian 0751	N.S.W.(1976)
Stout	Purdue 5939B1-3-9-3-5	QLD (1977)
Moore	Fulmark/Newton//Swan	W.A. (1977)
Hill	Ballidu/Kent//Radar 2	W.A. (1981)
Bulban	Algeribee/Garry//Avon	VIC (1981)
Carbeen	Fulgham/Garry//VRAF.VRSF.	N.S.W.(1981)
Nile	Blythe/Avon	TAS (1982)
Lort	Kent/Ballidu (M127)//Radar 2	W.A. (1982)

Barmah	Algeribee/Garry//Avon	VIC	(1982)
Mortlock	Elan 6161/3/(66Q01-63)Fulmark/Newton//Swan	W.A.	(1983)
Echidna	West/OT 207	S.A.	(1984)
Dolphin	West/OT 207	S.A.	(1984)
Winjardie	Fulmark/Newton//Swan(66Q01-44)/3/(XBVT 183) Kent/Ballidu (M127)//Curt	W.A.	(1984)
Murray	Fulmark/Newton//Swan(66Q01-44)/3/(XBVT 183) Kent/Ballide (M127)//Curt	W.A.	(1984)
Bundalong	Cayuse/Avon	VIC	(1984)

EVALUATION OF SMALL GRAIN GERMPLASM

L. W. Briggle
Plant Genetic and Germplasm Institute, ARS-USDA
Beltsville Agricultural Research Center

Systematic evaluation of accessions in the USDA-ARS National Small Grain Collection (NSGC) was initiated in 1983. Funding was obtained specifically for this purpose.

A set of descriptors appropriate for each of the crop species - wheat, barley, oats, and rice - has been determined in collaboration with the appropriate Crop Advisory Committees (CAC's).

A total of 5,000 wheats and 2,500 oats were grown for evaluation at Aberdeen, Idaho, in 1983. An additional 5,000 wheats, 2,500 oats, and 2,000 barleys were evaluated at Aberdeen in 1984. Field data were recorded on such descriptors as number of days from planting to anthesis, plant height, spike (or panicle) type, spike (or panicle) density, straw lodging, straw breakage, awn and glume characteristics. Spikes or panicles were collected from each accession at maturity. Seed and more precise spike (or panicle) data on the 1983 material were obtained this past winter in the laboratory. Each row was harvested and the grain weight recorded. Grain was returned to Beltsville for storage and further evaluation (disease and insect resistance, quality factors, etc.). Similarly, seed and spike (or panicle) data on the 1984 material will be obtained during the 1984-85 winter.

Approximately 2,000 additional wheats were evaluated at Mesa, Arizona in 1983 and another 2,000 at Maricopa, Arizona in 1984, and handled in much the same manner as that grown in Idaho, except that laboratory data have not been obtained.

A total of 7,500 small grain accessions will be similarly evaluated at Aberdeen, Idaho as well as approximately 3,000 additional wheats at Maricopa, Arizona in 1985.

Evaluation for disease and insect resistance was initiated during 1983, expanded in 1984, and further expansion is planned for 1985. Growth habit (winter or spring type) determination is also underway. Locations for these evaluations are listed below:

1983		1984	
St. Paul, MN	Wheat & Oat Stem Rust	St. Paul, MN	Wheat & Oat Stem Rust
Manhattan, KS	Wheat Leaf Rust	Manhattan, KS	Wheat Leaf Rust
Ames, IA	Oat Crown Rust	Pullman, WA	Wheat Stripe Rust
Urbana, IL	Oat BYDV	Ames, IA	Oat Crown Rust
Lafayette, IN	Wheat Hessian Fly	Urbana, IL	Oat BYDV
Bozeman, MT	Wheat Growth Habit	Lafayette, IN	Wheat Hessian Fly
		Corvallis, OR	Wheat Common and Dwarf Smut
		Bozeman, MT	Barley & Wheat Growth Habit

St. Paul, MN	Wheat and Oat Stem Rust
Manhattan, KS	Wheat Leaf Rust
Pullman, WA	Wheat Stripe Rust
Ames, IA	Oat Crown Rust
Urbana, IL	Oat BYDV
Lafayette, IN	Wheat Hessian Fly
Corvallis, OR	Wheat Common and Dwarf Smut
Bozeman, MT	Barley, Oat, and Wheat Growth Habit
Davis, CA	Wheat, Barley, & Oat BYDV
Fargo, ND	Barley Net Blotch, Spot Blotch, and Root Rot

An extremely valuable part of the NSGC is that of the related species. Some are misclassified. About 250 Aegilops accessions were grown and classified in the greenhouse at Columbia, MO, in 1983-84. Six hundred accessions of the Triticum species were grown in the greenhouse at Beltsville in 1983-84 for classification and seed increase. We expect to process another 1,200 at Beltsville in 1985. Chromosome counts on 250 particularly perplexing accessions are planned at Columbia, MO, in 1985.

REPORT FROM THE NATIONAL SMALL GRAIN COLLECTION

D. H. SMITH, JR.
CURATOR

Distributions from the collection amounted to approximately 500 individual requests for seed samples of the seven genera of crops held in the NSGC, namely, wheat, barley, oats, rice, rye, triticale, and Aegilops. Over 192,000 seed samples were sent out.

We have occupied a new 20' x 30' storage building manufactured by NORLAKE. It is equipped with air handling equipment that makes possible the maintenance of 50° F and 40% Relative Humidity which is the same environmental regime as the other two storage rooms.

Clearance for cultivar names can be easily accomplished by contacting us. We check our files for possible conflicts and then contact the Federal Seed Laboratory for a check of their files and also to get the approval of the Trademark Division.

In order to obtain a new PI number for a cultivar about to be released send me a sample of the seed, up to 500 grams, 15 grams minimum, and a brief description (a copy of the release statement will satisfy this need).

If you have materials to send out of the country we will handle the quarantine clearances for you. Just send us the samples, the name and address of the recipient, and a listing of what is being sent. We will have it inspected and the necessary phytosanitary certificate issued.

OAT PI NUMBERS ASSIGNED IN 1984

PI No.	Name/Designation	Pedigree	Class	Sour
483126	Monida	Cayuse/Otana		ID
486133	Kelly	Dal/Nodaway 70		SD
486134	SD 743358-12	Dal/Nodaway 70		SD
486135	SD 790369	Moore/Wright		SD
486136	SD 760062	Froker//Clintland 64/Garland		SD
486137	SD 752499	CI 8421/SD 701598		SD
487295	6179	Clinton//H. Culb/Pioneer/2/ Ky 64-10643	W	MO
487296	6311	Wintock//Clinton/H. Culb/2/ Compact	W	MO
487297	6312	Wintock//Clinton/H. Culb/2/ Compact	W	MO
487298	6727	Dubois/H. Culb//Ky 64-10643	W	MO
487299	6728	Dubois/H. Culb//Ky 64-10643	W	MO
487300	6865	Wintock//Clinton/H. Culb/2/ Compact	W	MO
487301	6881	Fla 62-671//Dubois/New York Sel.	W	MO
487302	6990	Pettis//Fla 62-671	W	MO
487303	6993	Pettis/2/8249/0-Curt/Ketra Ndy	W	MO
487304	6995	Ndy/7359//Pettis/Fla 500	W	MO
487305	7012	CI 7489/Ky 64-10643	W	MO
487306	7015	CI 8310/Fla 500	W	MO
487307	7023	Fla 62-671/2/Clinton/H. Culb //Pioneer	W	MO
487308	7192	Fla 62-671/2/Clinton/H. Culb //Pioneer	W	MO
487309	7194	CI 8310/Minn Agron 27	W	MO
487310	7198	4*LeConte/Dubois/3/Clinton/ H. Culb/2/Pioneer/4/Ky 64-10643	W	MO
487311	7200	4*LeConte/Dubois//Elan	W	MO
487312	7201	Cim//Haj/Joanette/2/Clinton /3/Santa Fe/4/Compact/6/ Pettis/5/Orbit	W	MO

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