

ANNUAL REPORT
Calendar Year, 1952

1. PROJECT: NORTH CENTRAL REGIONAL PROJECT NC-7

The Introduction, Multiplication, Preservation, and Determination of Potential Value of New Plants for Industrial and Other Purposes and for the Preservation of Valuable Germ Plasm of Economic Plants.

2. COOPERATING AGENCIES AND PRINCIPAL LEADERS

<u>State Agricultural Experiment Stations</u>	<u>Representative</u>
Illinois	C. M. Woodworth
Indiana	H. H. Kramer
Iowa	I. J. Johnson
Kansas	H. H. Laude
Michigan	C. M. Harrison
Minnesota	W. H. Alderman
Missouri	Joe D. Baldrige
Nebraska	F. D. Keim
North Dakota	T. E. Stoa
Ohio	F. S. Howlett
South Dakota	S. A. Mc Crory
Wisconsin	D. C. Smith

U. S. Department of Agriculture

Bureau of Plant Industry, Soils, and Agricultural Engineering	C. O. Erlanson
Soil Conservation Service	Grover Brown

Regional Coordinator

Primary Plant Introduction Station Ames, Iowa	Max M. Hoover
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Administrative Adviser

W. V. Lambert

The program of work under this project serves a two-fold function -- a Primary Station for Regional Project NC-7 and research project in the Iowa Agricultural Experiment Station. For this reason the results may have application both on a local and on a regional basis.

The Division of Plant Exploration and Introduction cooperates with Regional Project NC-7 by supplying plant materials following inspection and release by the Bureau of Entomology and Plant Quarantine. The Division of Plant Exploration and Introduction also provides the technical assistance of its Headquarters staff in the identification and placement of new introductions and contributes toward the salary of staff, office supplies, and equipment of the Primary Station.

Nine Experiment Stations of the North Central Region, because of their location, climate, or specialized research interest have been selected by the Technical Committee as secondary Stations for maintaining plant materials or for conducting certain phases of research having Regional application. Formal Experiment Station Projects have been recommended by the Technical Committee and approved for this work which is considered part of the NC-7 Project and is supported by Regional funds.

Several Experiment Stations, chosen because of their favorable climate, soil, or other factors increase seed of new introductions for the Primary Station on a contractual per accession cost basis.

One of the major objectives of the Technical Committee and the Primary Station is to assist in the organization and orientation of research activities in the respective states to accomplish a thorough job of screening and evaluation of new introductions now available through the NC-7 Project.

Primary Station: Land, Buildings, and Equipment

During the past year, ten acres of arable land located one mile east of the Primary Station ~~Field Headquarters~~ unit was made available by the Iowa Experiment Station for the increase and initial evaluation of new introductions. This increase of land brings the total acreage operated by the Primary Station to approximately 40 acres and has permitted the retirement of some steeply sloping land and establishment of green manure crop rotations on selected areas at the Headquarters unit.

The Iowa Experiment Station has obtained a use permit for custody of the buildings owned and formerly used by the Soil Conservation Nursery Division. The residence cottage and one of the equipment storage buildings has been assigned for Primary Station use. In addition a formal written request has been made for the assignment of an additional building to meet the expanding requirements of the Primary Station for seed storage.

Progress has been made in the rehabilitation and extension of irrigation lines formerly in use at the Headquarters unit. Extension of the water main has been made, riser valves have been installed below the plow line depth to facilitate cultivation operations and a fire hydrant installed for the protection of Headquarters' buildings.

During the year the Iowa Experiment Station procedure concerning amortization charges for purchase of equipment has been changed to a rental contract basis amounting to 10 per cent of the list cost. The equipment company agrees to replace the equipment unit at the end of one year or at the close of the second year of use at the option of the user. This change in policy has resulted advantageously, we believe, in the replacement of several heavy equipment items that had been used continuously for four crop seasons by the Primary Station.

Primary Station Production Program

The 1952 season was favorable for the increase of most crops at the Primary Station and resulted in the addition of 817 items to the cumulative Regional Seed List.

Table I -- New Accessions Grown in 1952 and Included on the Regional Seed List.

	Annual	Biennial	Perennial	Total
Group I . Field Crops - Grasses	72	-	4	76
Group I . Legumes	62	9	28	99
Group II . Fruits - Vegetables	581	35	-	616
Group III . Oil, Ornamental, - Special Crops	18	5	3	26
Total	733	49	35	817

The Production of 581 accessionf of annual vegetable crops was divided about evenly among peas, beans, cucumbers, tomatoes, squash, and pumpkins.

The total number of accessions for all crops now available for distribution to re-search workers is in excess of 5000.

Table II -- Seed Packets Distributed by the Primary Station During 1952

	NC	NE	So	W	Other	Total
Group I . Field Crops - Grasses	741	32	165	268	263	1469
Group I . Legumes	175	-	20	38	10	243
Group II . Fruits - Vegetables	1071	70	962	1135	184	3422
Group III . Oil, Ornamental, -Special Crops	110	-	16	116	24	266
Total	2097	102	1163	1557	481	5400

+ 9000 pkts. tomato
14,400

The Primary Station distributed 5400 packets of seed (exclusive of tomato) to re-search workers during the calendar year of 1952. Every effort will be made during the coming year to encourage the research workers at the several Experiment Stations in the North Central Region to increase the number of new introductions now being evaluated.

During the year 539 new accessions have been received. These new accessions along with approximately 450 lots of perennial species now established on the Primary Station plus those accessions to be regrown to maintain a satisfactory reserve seed supply will comprise the field production program for 1953.

Tomato Screening Program

During the calendar year of 1952 approximately 50 plant pathologists under the leadership of Dr. L. J. Alexander of the Wooster, Ohio, Experiment Station have cooperated on a Nation-wide screening program of tomato accessions.

This program was started in December 1951 at the Cincinnati meeting of the Phytopathological Society where agreement was reached that the 144 accessions of wild species of tomatoes available from the Primary Plant Introduction Station at Ames should be screened for reaction to twenty common tomato diseases.

A chairman was chosen for the group of pathologists carrying on research with a particular disease. The disease chairmen to be responsible for establishing standards for tests and reporting data to Dr. Alexander who would consolidate the research findings of all research groups.

The Primary Station distributed approximately 9000 packets of tomato seed to cooperating pathologists and assisted Dr. Alexander in initiating this research program. ✓

A progress report by workers was made at the AIBS meetings in Ithaca, New York, in September. At this meeting it was agreed by the Cooperating pathologists to repeat the work in 1953 using not only the same 144 accessions of wild species but also to exchange different pathogenic races between workers in order to make the screening as comparable and complete as possible.

Research data obtained for the two years will then be assembled and published for use of all Research workers.

This concerted effort by pathologists should result in the rapid accumulation of useful data concerning the true value of these stocks for plant breeding. Elimination of useless and duplicate accessions can be made on the basis of these research results and thus permit a reduction in number of stocks carried. The amount of research time saved by this cooperative effort is enormous when compared to the research time previously used by individual workers in the assay of these plant materials.

Another very important result of this effort is the probable application to other crops. By careful organization and group action of workers the total job of screening is shortened and future research can be concentrated on those accessions of special value and promise.

Seed Contracts with State Experiment Stations

Contracts for the increase of seed on a per accession cost basis were as follows:

Safflower	Kansas and Nebraska
<u>Cucurbita</u>	Minnesota
Onions	Ohio
Peas	Wisconsin

The cost of these contracts amounted to \$1415.00 and resulted in obtaining an increase of seed of species that are not well-adapted to the Primary Station and if grown at Ames would have been more costly than when grown under contract.

NC-7 Technical Committee Meeting

The Technical Committee meeting was held August 25-26, 1952, at the Wooster, Ohio, Agricultural Experiment Station. The minutes of this meeting give in detail the various items of business covered by the agenda including reports of progress by the several states of the Region carrying on NC-7 work under formal State Projects, Report of the Primary Station Production and Distribution, Consideration of New Projects, Budget Recommendations, and the Report of the Executive Committee.

Major items of the Executive committee report are included here to place further emphasis on matters that will require the special attention of Technical Committee members prior to their next meeting scheduled for late August or early September, 1952, at Ames, Iowa.

The Executive Committee for Regional Project NC-7 made the following recommendations:

1. Regional Project NC-7 now has been in active operation for five years. Each state receiving 9b3 funds for support of research work under NC-7 should carefully examine its program and budget needs prior to the next meeting of the committee. Some lines of work may be in position to be curtailed; others may need to be expanded with corresponding changes in support. New projects may need to be initiated. All programs should be carefully reviewed by the executive committee during the coming year.
2. We recommend activation of the proposed project by the Illinois Experiment Station on the preservation of maize genetic stocks with a budget of \$2500 to become effective July 1, 1953.
3. We recommend that the proposed project on ornamental plantings for the Great Plains should be considered on an interstate basis with the appointment of a committee from within the four western states and the Primary Station to draw up a cooperative project. This will be considered for possible approval and for activation on July 1, 1954.
4. The executive committee reiterates the stand taken by this technical committee and by the National Coordinating Committee on the policies of evaluation.

Evaluation of characteristics of tomatoes as undertaken in this project is considered to be an appropriate level of evaluation. We recognize that the specific place where preliminary evaluation ends and final evaluation begins is often difficult to determine. The project leaders with the major objective of NC-7 in mind may best be the ones to determine where preliminary evaluation stops for a specific crop in question.

These recommendations prepared by:

- G. M. Browning, alternate administrative adviser
- M. M. Hoover, Regional Coordinator NC-7
- W. H. Alderman, technical committee
- F. D. Keim, technical committee
- I. J. Johnson, chairman, technical committee

Western Region Technical Committee Meeting

The Technical Committee for the Western Region met in Salt Lake City December 11,-12, 1952.

The Coordinator for the North Central Region was invited to attend the Salt Lake City meeting and present a report of progress for the NC-7 project. Although the Western Region has been delayed in its organization and in obtaining funds, the interest of state committee members indicated that Plant Introduction work will receive support and emphasis throughout the Western Region.

The plan of organization for the Western Region is comparable to that of the North Central Region and every effort is being made to establish a Primary Station as a Regional Facility with funds presently available.

The Coordinator returned from this meeting of the Western Technical Committee with the feeling of hope and promise that the Western Region is being well-organized and that a strong and active program will be developed.

Progress Report on Projects Receiving NC-7 Assistance and other
Related Research Conducted by States of the Region

Illinois: The Assembly, Evaluation, Seed Increase, and Distribution of New Introductions and Genetic and Chromosomal Tester Stocks in Maize.

\$2500 annually starting 7-1-53

Progress: Preliminary steps to inaugurate this project are as follows: (1) Several days were spent at Cornell University last fall studying the genetic stocks available there. Small lots of seed from several hundred lines were obtained. These will be grown at Illinois in the summer of 1953 for increase and for crossing with inbred lines of proper maturity. (2) A letter was mailed to all maize workers informing them of the present status of the Illinois Project and asking them to send in an inventory of their genetic stocks. A number of inventories have been received in response to this request. (3) The Research Board of the University of Illinois has granted \$2500 to complement the NC-7 grant and permit research work on (a) the development of new combinations of genes, (b) new linkage determinations and (c) a search for new genes that could not be properly supported by NC-7 funds.

The Agronomy Department has secured accessions of castor beans, alfalfa, soy beans and broom corn for evaluation. Approximately 1200 soybeans were evaluated intensively by the U. S. Regional Soybean Laboratory and nearly 140 new accessions were grown for classification as to maturity.

The Horticulture Department has screened 143 accessions of wild tomato species for several diseases as a contribution of the Illinois Experiment Station to the national screening of tomatoes previously discussed.

Other research projects concerned with high acid content of tomatoes and evaluation of fruit varieties have made use of newly introduced plant species obtained through the NC-7 Project.

Indiana: The Collection, Preservation, and Testing of Prunus for Cherry Leaf Spot (Cocomyces sp.) Resistance \$1000 annually since 7-1-50

Progress: "The Prunus planting consists of 47 items of various plum and cherry species. In addition, some 32 plant introductions of sour cherry (Prunus cerasus) and sweet cherry (Prunus avium) have been established. Ten of the sour cherry introductions failed to survive the winters of 1950 and 1951 and were re-established in 1952. There appear to be some differences this year among these introductions in susceptibility to leaf spot although the trees must reach larger sizes to give dependable tests. Two sweet cherry introductions, PI 185796 and PI 185797, are particularly outstanding among the varieties of P. avium in their ability to retain their foliage under epidemic conditions of the disease. These introductions were made from Germany and France respectively."

Items lost by winter killing will be repropagated and surveys will be made during the growing season to determine leaf spot infection. Indexing on Montmorancy and other hosts will be made to determine the virus content of various clones. Items available to workers in Stone Fruit Viruses will be circulated in the four regions of the United States.

The Indiana Experiment Station has been active and helpful in screening and evaluating Sunflowers, alfalfa, forage grasses, and field crops. Seed increase on a per accession cost basis has been conducted by members of the Experiment Station staff.

Iowa: The Iowa Experiment Station has no formal project receiving NC-7 assistance except the Primary Plant Introduction Station. However, the Experiment Station has a Research Project with objectives similar to NC-7 in which all plant divisions of the Station cooperate in the evaluation of new introductions, and give technical assistance in the production program of the Primary Station make direct use of plant materials supplied by the Primary Station.

Kansas: Multiplication, Preservation, and Determination of Potential Value of Forage Grasses and Legumes \$2000 annually since 7-1-49

Progress: "Preliminary evaluations were made on new material that was added this year. More than 1500 spaced plants were established. Field notes were taken on such characteristics as leafiness, vigor, earliness, freedom from diseases, and others. Included were 7 species of grass and one legume. Further study of the 1949 collection included setting out progeny of 236 selections involving 5 species of grass. Three hundred seventy-six clones of the 1950 evaluation nursery were saved and transplanted to isolation blocks and the rest of the nursery discarded. Included among the clones saved were 5 species of grass. Four legume species are still under observation.

"A high degree of variability has been found in this material and plants with desired characteristics have been saved or seed saved for further propagation and investigation. Small amounts of superior seed are available to grass breeders.

"The 1951 nursery will be ready for evaluation for the first time and further work will be done on the 1950 nursery which underwent considerable stress from drought this year. Additional collections of native grasses and their establishment are planned in order to supplement the major deficiencies in range and type of material evaluated to date."

Kansas: Maintenance of Viable Seed of Open-pollinated Corn Varieties \$500 annually since 7-1-50

Progress: "New seed of 11 varieties of open-pollinated corn was produced by hand sib pollination. A late white composite of 12 strains and a blue and white composite of 13 strains were produced in isolated fields. A late yellow composite of 14 strains failed because of the adverse season and will be repeated in 1953.

"The seed produced will be placed in storage for use as a source of germ plasm for corn breeding work. Before losing its viability it will be grown again to provide new seed.

"Germination tests will be made on the seed now in storage and those samples showing low germination will be grown to provide a fresh supply."

The Kansas Experiment Station has assisted in the multiplication of safflower seed under contract.

Michigan: The Michigan Experiment Station does not have active formal projects receiving NC-7 assistance. Mint stocks, that formerly received NC-7 support, are now maintained by the Experiment Station. However, these stocks are available to research workers upon request.

Michigan has assisted in the screening and evaluation of many of the plant materials assembled and maintained under this Regional project. The Michigan Experiment Station has also given assistance in multiplication of seed of celery, carrots, onions, and spinach; but no seed increase was made during this calendar year.

Minnesota: Testing Newly Introduced Plants for Susceptibility or Resistance to Disease. \$1000 annually since 7-1-47

Progress: "Each year, new and promising lines of varieties of spring wheat from different institutions in the United States, Canada, and Mexico, are tested for their reaction to the major diseases and potential important diseases in the 'Disease Garden' at University Farm. In these tests the varieties are grown in the same plot of land in successive years and subjected to the most severe tests that can be devised. In 1952 a total of 2925 varieties and selections of spring wheat was tested in the field for resistance to bunt, scab, root rot, stem and leaf rust, loose smut, and insect injury. The origin of these lines and varieties was as follows: Minnesota, 1294; United States Department of Agriculture, 1139; Texas, 40; Wisconsin, 15; North Dakota, 56; Brazil, 7; Mexico, 255; and Canada, 117. Valuable data were obtained on the reactions of the tested material to scab, root rot and stem and leaf rust. Due to adverse weather conditions, the other diseases did not occur in epidemic proportions; hence only limited data were obtained on them.

"The finding of new sources of resistance for future breeding work and the elimination of undesirable susceptible lines are important public benefits that accrue from this work. In addition, the testing at Minnesota of lines from other stations makes it possible to determine their reactions to diseases under different environmental conditions. Selections of resistant material were made from the disease garden, and a detailed report on varietal reaction was sent to the cooperators at different institutions in order to help them make their own selections. Since diseases are widespread in the spring wheat region, any information on varietal reaction to diseases obtained at Minnesota is likewise valuable in any spring wheat growing state.

"The plan for 1953 is to continue the same line of work, testing all material made available by different institutions in North America, with greater emphasis on obtaining more satisfactory epidemics on certain diseases."

Minnesota: Introduction, Preservation, and Evaluation of Stone Fruits of Probable Potential Value to the North Central Region \$1000 annually since 7-1-50

Progress: "This project has essentially two objectives: (1) To aid the University of Minnesota Fruit Breeding Farm in maintaining, enlarging, and evaluating a large collection of stone fruit species, selections, and varieties; and (2) To list in the Regional Breeders Stock Inventory those varieties which are believed to possess valuable qualities for breeding purposes and to maintain such varieties as a reservoir of germ plasm available to fruit breeders.

"The magnitude of the collections maintained under the first objective varies from year to year as varieties are discarded and others are added. During 1952 the collection contained 733 varieties exclusive of recent accessions still in the nursery and seedlings in breeding experiments. These are grouped as follows:

Plums and cherry plums	450
Apricot	88
Cherries	95
Peach and almond	<u>100</u>
	733

"During 1952 considerable time has been spent in studying and evaluating the material in the general collection. As a result of this study 20 additional varieties have been described and listed in the Regional Breeders Stock Inventory. This brings the total number of varieties being maintained in the germ plasm reservoir to 172. These are classified into the following groups.

Almond	3 var.
Apricot & interspecific hybrids	30 var.
Cherries - Korean (<i>P. japonica</i>)	4 var.
Nanking (<i>P. tomentosa</i>) & interspecific hybrids	5 var.
Sour and interspecific hybrids	10 var.
Sweet	10 var.
Peach and interspecific hybrids	35 var.
Plum, mostly <i>P. domestica</i> & interspecific hybrids	34 var.
Plum, misc. sp. & interspecific hybrids	<u>41 var.</u>
Total	172 var.

"Requests for propagating wood have been received from within and without the North Central Region. It has been possible to fill these requests with either bud wood or dormant cions. In a few cases trees have been supplied, but ordinarily ~~these~~ would not be available on short notice.

"The widespread interest in stone fruit virus research has focused attention on this collection of material. Through the cooperation of Dr. T. H. King of the Department of Plant Pathology this list of stone fruit species and varieties has been compiled and distributed to workers in the virus field.

"The work of building and maintaining the collection and evaluating the varieties will be continued as in the past."

The Minnesota Experiment Station has assisted the Primary Station by increasing seed under contract and also in the screening and evaluation of many introductions of forage grasses and legumes, field crops and vegetables.

Missouri: Preservation of Viable Seed Stocks of Open-pollinated Varieties of Corn Adapted to Missouri and Adjoining States \$500 Annually since 7-1-52

Progress: "This project is concerned with the maintenance of viable seed stocks of open-pollinated varieties of corn collected in Missouri. The project did not become active until July 1, 1952. The funds were then used to pay for the increase of 15 open-pollinated strains which had been started in the spring.

"Now that the project is active and funds are assured for the coming year, as many as possible - perhaps 30 - of the remaining open-pollinated strains will be increased and stored during 1953."

Nebraska: Preservation of Alfalfa Clones and Seed Stocks needed in Alfalfa Improvement \$500 Annually since 7-1-49

Progress: "Limited populations of plants from each of 26 Foreign Plant Introductions of alfalfa were started in the greenhouse during the late spring and transplanted in the field during the summer of 1952. This makes a total of 128 foreign accessions included in observational field plantings at Lincoln during the calendar years 1949 to 1952 inclusive. Material established in 1952 showed insufficient

development to warrant performance appraisal. Summary of performance of the 82 accessions established in the field in 1949 and 1950 show 32 of these to be too winter tender to withstand the climatic conditions which prevail in the latitude of Lincoln, Nebraska. The remaining 50 lots of this group have good stands.

"Eleven clonal lines selected at Beltsville, Maryland, were vegetatively increased and established in a clonal nursery at Lincoln. Later the best of these and a male sterile line received from Canada will be established in the permanent nursery which at present is comprised of 325 clones (25 of these added in 1952) which represent a rather extensive array of superior germ plasm stocks.

"These studies give maximum assurance of perpetuation of those genotypes which may later be used in the construction of superior synthetic varieties.

"Additional clones will be transferred to the permanent nursery and further evaluation of Foreign Plant Introductions and collections indigenous to this country will be made."

Nebraska: Preservation of Viable Seed Stocks of Open-pollinated Regional Strains of Varieties of Corn \$600 annually since 7-1-50

"This project is concerned with the maintenance of viable seed stocks of corn varieties and strains which were collected in the state before they were completely replaced with hybrids.

"Fourteen lots of material, several representing composites of selected strains within a given area, are being maintained. Six of these were grown in 1952 in isolated blocks of $\frac{1}{4}$ to $\frac{1}{2}$ acre in size.

"The following varieties or composites were grown:

<u>State</u>	<u>Acc. #</u>	<u>Material</u>	<u>Year Last Grown</u>
Nebr.	7c	Midseason variety composite	1948
Nebr.	9c	(Minn.13) Box Butte county var.	1948
Nebr.	11c	Krug Yellow Dent (Shoup's strain)	1948
Nebr.	12c	Reid Yellow Dent (Newbold strain)	1948
Nebr.	1c	Cattle corn	1950
Nebr.	14c	Red Meadowbrook (Reid type)	1947

"Ample seed supplies of all lots were obtained."

Nebraska: Preservation and Preliminary Evaluation of Important Native and Introduced Grasses Considered Valuable in Improvement for Forage and Conservation Purposes \$1200 annually since 7-1-49

Progress: Nurseries of clones and space-planted plants of different ages were maintained and observed in 1952. The 100 clonal lines and 20-40 plants each of over 150 seed accessions, collected in 1949 and planted in 1950, were evaluated in their third year. Original plantings of Agropyron, Festuca, and Dactylis were discarded at the end of the season. Selections of tall wheatgrass (A. elongatum) and crested wheatgrass (A. desertorum) clones, as well as crested wheatgrass seedlings of the same accessions from a summer survival test, were moved to new crossing blocks. Seedling progenies, 40 plants each, of 30 slender wheatgrass (A. trachycaulum) selections were grown as spaced plants. Thirteen clonal selections of bluestem from Ames, Iowa, were established in a crossing block with 200 local selections for hybridization. Fifteen seed collections of sand bluestem were made for advanced studies.

"Nurseries of side-oats grams, switchgrass, sand bluestem, and Indiangrass introduced from Oklahoma and Kansas collections, were grown with Nebraska accessions for the purpose of studying winter survival and length of growing season. Selections will be made for hybridization of good vegetative types of southern extraction with locally adapted materials.

"Pure stands and selected mixtures of three warm-season and four cool-season grasses were compared in their third season of growth. Big bluestem and bromegrass have been the dominant grasses in this study, with sideoats grama and sand lovegrass important components in mixtures.

"Further selection and utilization in breeding of selected plants from introductions in the groups: Wheatgrasses, bluestems, grama grasses, sand lovegrass, switchgrass, reed canary grass, and Indiangrass.

"Further collection of native grasses will be made particularly in the bluestems, grama grasses, buffalo grass, and Indian grass."

The Nebraska Experiment Station has assisted in the production of safflower seed under contract and in evaluating new introductions of forage grasses and legumes.

North Dakota: Preservation of Certain Physiologic Races of Flax Rust (Melampsora lini) \$500 annually since 7-1-50

Progress: "The 50 races of flax rust required to identify and differentiate the rust conditioning genes in flax were maintained by running them through their selective hosts in late fall and early spring and storing the urediospores in glass vials at low temperatures.

"The rust reaction of 103 hybrid lines selected for growing in 1952 yield test nursery was determined. Twenty-three of Mr. Heggeness's most promising hybrids were tested for rust reaction as was one sample of flaxseed from Finland secured by Mr. Stoa. The rust-conditioning genes in 54 of Dr. Culbertson's Ottawa 770B x Dakota x Bombay lines were determined by the selective virulence of specific races. The rust reaction of 4 introductions from Japan and 19 from Ethiopia were tested. Some resistant plants were found in the Ethiopian lines. These are being grown to maturity for further testing to determine if they contain new sources of rust-resistant germ plasm.

"The races have been used to identify the F1 plants carrying the resistant genes in the backcrosses to Bison of the 30 lines of flax each of which apparently carries a single, unique rust-conditioning gene. These lines are in the second to sixth backcross.

"A number of reports of rust in resistant varieties have been received. By the use of selected races it has been shown that in every instance the rusted plants were admixtures.

"It is planned to conduct the work next year much as it was conducted this year. Flax breeders in North America have been informed of the services available to them and have been invited to submit their more advanced lines for a rust test."

North Dakota: Preservation of Viable Seed Stocks of Open-pollinated Strains or Varieties of Corn Grown in the Northern Great Plains.

\$500 Annually since 7-1-49

Progress: "Seed samples (100 grams to 1000 grams) of 67 corn varieties or strains adapted to this northern region are stored in moisture-proof containers.

"Twenty-four selected varieties were grown in 1952, field data were recorded and seed increased by compound-sib pollination.

"The reserve seed supply in some varieties is adequate (up to 4000 grams) while in certain other varieties the seed is exhausted by the numerous requests from the federal and state research agencies.

"About 100 seed samples (25 to 500 seeds each) were sent to the federal or state research or service agencies, where they are used for genetic and pathological research. Three varieties, Haney Minn. 13, Alta yellow dent and Rosebud blue flour, are now used in developing new inbred lines in North Dakota.

"Seed at hand will be stored and seed requests filled. Seed supplies will be increased where ever needed."

Ohio: The Multiplication, Preservation, and Determination of Potential Value of Pear Varieties for North Central States Introduced into and Collected within the United States. \$500 annually since 7-1-49

Progress:

"Over 145 varieties and seedlings of pear (Pyrus Communis and hybrids of Oriental and European origin) are now growing in the orchards and are being evaluated with respect to fruit characters as they come into bearing. Four not previously fruited were evaluated this autumn. The descriptions of all varieties and seedlings were re-examined during August to November, 1952, as the fruits of each variety were ripened under controlled conditions following harvest. These descriptions are now being prepared for publication of the essential details contained therein.

"A new orchard of Old Home pear trees upon which varieties are to be top-worked was started in the fall of 1951 and was completed in November 1952. Budding of varieties upon these trees was continued in the summer of 1952.

"The evaluation has produced the following results: (1) Certain varieties which must be harvested late generally ripen unsatisfactorily at Wooster and would not be suitable for commercial planting. Among these are: Alexander III, Clyde, Covert, Ovid, Waite, Willard, and Tardive de Ninove (PI 131568); and (2) The following varieties have exhibited the highest dessert quality and deserve limited commercial planting or use in a pear breeding program: Belerschmidt, Beurre Du Mont, Dana Hovey, Doyenne Georges Boucher (PI 131486), Early Seckel, Ewart, Laxton's Progress (PI 127039), and Robert de Neufville (PI 125739).

"Work planned for next year: (1) Continuation of evaluation of varieties coming into bearing for first time. (2) Preparation of bulletin evaluating varieties up to this point. (3) Establishment of at least three trees of each variety on Old Home."

Ohio: The evaluation of the Collection of Domestic and Wild Species of Tomato and the Maintenance of the Desirable Accessions and Valuable Breeding Stocks \$1000 annually since 7-1-49

Progress: "One hundred sixty-five accessions of Lycopersicon were evaluated for vine and fruit characters and for resistance to certain diseases. In addition, several inbred lines which have value as gene markers were included. All accessions were classified according to the same characters which were used last year. The majority of the seed multiplication work was carried on at Wooster, Ohio, the remainder at Ames, Iowa. The results have been published through 1951. Approximately 1000 accessions have now been classified and placed in storage in the North Central Regional cold storage at Ames, Iowa.

"In December of 1951 an effort was made to seek assistance from workers in other states to test all or part of the Lycopersicon accessions for resistance to the major diseases of North America. Forty-five workers in 24 states, Hawaii,

Canada, and two commercial canning companies entered the plan. Interest was shown in the following diseases: Alternaria, anthracnose, Bacterial wilt, Cladosporium leaf mold, frost tolerance, Fusarium wilt, nematodes, Phytophthora leaf blight, spotted wilt, Septoria leaf spot, tobacco etch, Stemphylium leaf spot, tobacco mosaic, Verticillium wilt, crack resistance, phoma rot, Sclerotium rolfsii, and seed multiplication. The 45 workers were divided into groups to test and evaluate the accessions for the diseases with which they were principally concerned. Some workers were assigned more than one disease. Fusarium wilt and Alternaria leaf spot drew the most attention.

"At the organization meeting last December, it was decided to limit the first year's work to classifying the 144 accessions of the wild species. Accordingly seed was divided and dispersed to the workers.

"The results of this work, especially the evaluation of the accessions and the work of the National Screening Committee, make it possible for tomato breeders to select from the published seed list and reports of the Screening Committee seed for breeding material which will be of value directly to them. This allows them to proceed directly without the necessity of growing all the lines.

"The work planned for the coming year includes a revision of the 1951 seed list to include the accessions grown in 1952. Because of the seed drain for the National Disease Resistance Testing program, considerable effort will be spent in multiplying seed of those accessions which fruit sparsely. Additional genetic testers are being multiplied as are also several autotetraploids."

The Ohio Experiment Station has assisted in screening and evaluating new introductions distributed by the Primary Station and in growing seed under contract. Research work in Ohio with cucumbers has shown certain new introductions to possess high tolerance or resistance to two of the major diseases of this crop.

South Dakota: The Collecting, Preserving, Cataloging, Propagating, and Testing of Fruit Plants having Potential Genetic Value.

\$2500 annually since 7-1-47

Progress: "This collection of fruit plants having genetic value is maintained under conditions similar to that given an orchard. Maintenance is complicated by a great collection and record keeping. Evaluation studies now make up the greater part of this work. Three plants from this collection have been studied as root stocks for apples. Tests for winter hardiness, disease resistance, quality of fruit, and value as pollen parents were made during the year. Some material was distributed to other experiment stations for their use.

"A very promising root stock, forming a semi-dwarf tree, has come from this material. Scab resistance has been found in two selections and is now being used in breeding for scab resistance at other stations.

"This is a collection of material brought to the United States from Siberia by the late N. E. Hansen. Its value has not been determined, but offers a great source of supply for many phases of fruit work.

"Major emphasis will be placed on evaluation studies. A more extensive testing of root stocks will be started. A brief descriptive list of the material will be published."

Wisconsin: The Wisconsin Experiment Station does not have an active project receiving NC-7 assistance. However, there are many phases of Experiment Station research that are closely related to the project as presented in the following summary:

"R. G. Shands grew 300 spring wheats as plant introductions from Australia, India, Turkey, and France. These were evaluated for mildew, leaf rust, and stem rust resistance. Another set of 139 C.I. selections were tested. Twenty accessions obtained from South America by Cereal Division travellers were grown. Another group of 150 strains obtained as PI lots were observed in field plantings.

"A total of 3093 spring oats accessions and including numbers up to CI 5343 were grown by H. L. Shands as the CI Oat collection in 1951. An additional 259 plant introductions were grown. Strains were classified for stem rust, crown rust and Dark Stem (Septoria) reaction. They were observed also for stiffness of straw, heading date and other agronomic characters. Some plant introductions appeared to be promising for disease resistance. Some mixed stocks included desirable plant types.

"N. P. Neal and A. M. Strommen grew about 35 plant introduction lots of corn for observation at the Madison and Spooner experiment stations. These were from Australia, Italy, Netherlands, Germany, Austria, and Israel. These were studied for possible value as sources of new inbred lines. While the season was generally unfavorable most of the strains were late, susceptible to lodging and produced ears high on the stalks.

"R. A. Brink evaluated clonally reproduced alfalfas derived from foreign plant introduction from Turkey. These were generally unpromising being susceptible to wilt or to winter injury in many instances. A diploid M. falcata type from Sweden and presumably from the Caucasus region earlier has proved to be of interest and has been hybridized with other alfalfa selections. Dr. Brink has also tested a large number of new introductions of corn, giving particular study to genes determining (P) pericarp character.

"Two Agropyron and Bromus species lots obtained as foreign plant introductions were included in grass nursery test plantings by D. C. Smith and E. L. Nielsen. These are part of a larger collection of strains of these species being observed for possible direct economic value and as sources of specific useful characters.

"D. J. Hagedorn grew about 100 PI strains of peas in observational tests. Fifty of these were tested for root rot (Aphanomycea) resistance. Some strains were tested at the Ashland station for comparative value as hay. Other lots were observed for maturity, growth habit, pod characters and uniformity. Seed of many strains was reproduced. A varietal collection of domestic and other commercial canning peas is being maintained.

"G. S. Pound grew 121 spinach, 27 radish, 43 carrot, and 29 Brassica strains at Madison. The spinach lots were observed for cucumber virus 1 reaction and resistance to white rust (Albugo occidentalis). While generally worthless for other economic characters many lots resistant to virus were found. Radish strains were tested for reaction to Fusarium wilt (F. oxysporum raphani). Variations were noted in reaction of carrot strains to aster yellows. Brassicas were tested for reaction to cabbage mosaic virus and to Club Root. Some strains were found to be resistant to the former diseases.

"Warren Gabelman reported utilization of South African and English onion varieties in breeding trials, though these were not obtained through the Plant Introduction program.

"A. J. Riker conducted evaluation work with Quercus strains from Harvard collections and Populus strains from United States and Canada. With Quercus oak wilt reaction is of principal interest."

A total of 183 strains of newly introduced sorghums were obtained from the Primary Station for the Southern Region and evaluated for reaction to two bacterial diseases, leaf blight, general vigor, type, and maturity. Two lots appeared to be nearly immune to leaf blight when grown at Madison and were used as parents in crosses to produce more blight-resistant sudan grass.

The Wisconsin Experiment station has also given assistance in the seed increase of pea accessions under contract arrangements with the Primary Plant Introduction Station.

4. APPLICATION OF RESULTS AND BENEFITS REALIZED

Plant materials made available through the NC-7 Project to research workers of the North Central and other Experiment Stations are finding important use in current plant breeding programs. With the exception of tomatoes discussed previously there has been very little progress in establishing an organized effort among research workers for screening and evaluating the various crop species. We believe the progress and experience gained through the cooperation of tomato workers may well serve as a guide to be followed by workers in other crops where organized effort by workers may be feasible. Even without planned organization by research workers, there are many instances with field crops including grasses and legumes and also with certain of the vegetables where particular accessions appear to possess outstanding characteristics of value for breeding purposes.

Foreexample, a recent tomato introduction possesses not only high yield, but has been shown to have high acid, a characteristic desired by the canning industry. A cucumber has shown tolerance or high resistance to downy mildew and anthracnose. Several new accessions of early peas tested in Wisconsin appear promising for use in combination with oats for hay making and new introductions of brome and alfalfa now appear to have good possibilities for use in improving forage species.

Although this information appears to be building up very slowly in view of the vast amount of material now available for careful screening and evaluation, we should be heartened that progress is being made and there is good reason to believe that research workers are becoming better acquainted with the material with which they are working.

5. WORK PLANNED FOR NEXT YEAR

We hope to carry out the recommendations of the Executive Committee as listed under a preceding section of this report. These recommendations establish worth while project objectives and contribute toward improving the NC-7 Project.

The production program will continue with the same objectives as in previous years. If the number of new introductions falls materially below those of previous years, the Primary Station is in position to use its staff and facilities in providing more screening and evaluation information than now obtained during the initial year of seed increase.

The work of rehabilitating the irrigation system at the Field headquarters will be continued inasmuch as this will provide insurance for maintaining and multiplying seed stock of species requiring special care.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR

Memo-graph of the 1952 seed list of plant materials available for distribution under Regional Project NC-7. This seed list is cumulative over the past five years and will carry more than 5000 items.

Publication of classification of approximately 1000 accessions of tomatoes assembled and maintained by the Wooster, Ohio, Experiment Station.

Publication of two years' screening data obtained by the cooperation of approximately 50 pathologists working with twenty important diseases as related to 144 accessions of wild species of tomato.

Publication of a Roster of Research Workers of the North Central Region and the crops in which each worker has special interest. This publication will represent the contribution from the North Central Region to a National Roster of similar character now being assembled by the Headquarters Office of the Division of Plant Exploration and Introduction.

7. APPROVED



Chairman, Technical Committee



Regional Administrative Adviser