ANNUAL REPORT
Calendar Year, 1953

1. PROJECT: NORTH CENTRAL REGIONAL PROJECT NC-7.

The Introduction, Testing, Multiplication and Preservation of New and Useful Plants of Potential Value for Industrial and Other Uses and for the Preservation of Valuable Germplasm of Economic Plants.

2. COOPERATING AGENCIES AND PRINCIPAL LEADERS

	Representative
State Agricultural Experiment Stations	
Illinois	C. M. Woodworth
Indiana	E. C. Stevenson
Iowa	I. J. Johnson
Kansas	R. C. Pickett
Michigan	C. M. Harrison
Minnesota	F. A. Krantz
Missouri	J. D. Baldridge
Nebraska	L. C. Newell
North Dakota	T. E. Stoa
Ohio	F. S. Howlett
South Dakota	S. A. McCrory
Wisconsin	D. C. Smith
U. S. Department of Agriculture	
Agricultural Research Service, Plant Introduction Section	C. O. Erlanson W. H. Hodge
Office of Experiment Stations	F. D. Fromme C. L. Lefebvre
Soil Conservation Service	Grover Brown
Primary Plant Introduction Station Ames, Iowa	
Regional Coordinator	Max M. Hoover Albert F. Dodge
Administrative Adviser	W. V. Lambert

3. NATURE OF WORK AND PRINCIPAL RESULTS OF THE YEAR.

Regional Project NC-7 is cooperative between the Experiment Stations of the North Central Region and the Plant Introduction Section of the Agricultural Research Service. Under this cooperative arrangement the Regional Primary Station at Ames, Iowa, serves as a center for the initial evaluation, seed increase and maintenance of newly introduced plant materials.

The Experiment Stations of the North Central Region cooperate in the screening, evaluation and use of these plant materials in their respective research programs for crop improvement. Performance data reported by research workers are assembled by the Primary Station for distribution to all interested research workers of the region.

The Plant Introduction Section obtains plant materials and contributes technical assistance of its Headquarters staff in the identification and placement of these introductions. The Plant Introduction Section also provides certain office supplies, equipment and pays portions of the salary of technical staff members of the Regional Primary Station.

The Regional Technical Committee prepares and submits the annual budget, recommends regional projects and provides general technical and administrative guidance to the program of the Primary Station. This Technical Committee also performs a very important function in assisting in the organization of research activities in support of NC-7 objectives. Representatives to the regional committee from the respective states of the North Central Region serve as experiment station staff coordinators in their states.

Primary Station: Land, Buildings and Equipment

During the calendar year covered by this report, permanent improvements consisting of a portable irrigation system and enlargement of the greenhouse unit were completed. Both of these improvements have increased the efficiency with which the Primary Station conducts its production program.

Approximately 40 acres of land are available for crop production. This acreage is adequate for the Primary Station at present and permits the establishment of crop rotations and the use of green manure crops to maintain soil fertility. However, additional crop acreage will be required to meet the future needs as the number of perennial woody and herbaceous species now being established for evaluation on the Primary Station continues to require more space for maintenance.

The Primary Station provides controlled humidity and temperature storage for the reserve seed stocks of more than 5600 accessions carried on the Regional seed inventory. This storage is used also by the states of Kansas and Nebraska for maintaining reserve seed stocks of open-pollinated corn varieties. At the present time the available storage space is very limited and provision should be made for expansion if the Primary Station is to continue this present seed storage service to states of the Region and to meet the expanding needs for storage of seed increased at the Primary Station.

The average annual increment of new accessions added to the Regional storage is approximately 1000 items.

Primary Station Seed Production and Distribution

A summary of seed increase and initial evaluation work of the Primary Station is prepared at the close of each crop production year by assembling and distributing the annual seed list to research workers of the region. This seed list contains agronomic and descriptive information of each accession that was successfully increased. Photographs are used to supplement the descriptive information where possible and become a part of the performance record maintained for each accession by the Primary Station.

In reporting the Primary Station production program for the 1953 calendar year it seems most convenient and appropriate to present this information as summary tables.

Three broad crop groups are recognized by the Plant Introduction Section in the placement of new introductions. These consist of Group I(a) Field Crops and Grasses; Group I (b) Legumes; Group II Fruits and Vegetables; and Group III Ornamental, Oil and Special Crops.

In addition to listing the broad range of plant genera (120) introduced by the New Plants program, the summary table shows that about 75 percent of the 7630 accessions received have been grown successfully at the Primary Station and these comprise the 5678 items carried on the inventory and seed list.

The last column of Table 1 shows a distribution of 4099 seed packets to research workers of the North Central Region during the past calendar year. More than half of the packets distributed were Fruits and Vegetables, followed in order by Grasses and Legumes, with relatively small demand for seed packets of plant materials in Group III Ornamental, Oil and Special Crops.

The production program of the Primary Station for 1954 will include the accessions in the table 1 column designated "1954 Production" and these will be augmented by accessions now on the seed list that require seed replacement because of low viability or depletion of stock. Hence, it is estimated that approximately 1200 accessions will be grown at the Primary Station during the next crop season. This is approximately the volume of average annual production at the Primary Station during the past five years.

Table 1. Cumulative Total of Accessions Received; Increased; Established; to be Grown 1954, and Distributed during 1953.

Group I. Grasses and Field Crops.

Genera	No. accessions (cumulative) Received	Increased	Established	1954 Production	1953 Distribution
Aegilops	58	49	0	9	15
Agropyron	72	31	33	33	178
Agrostis	24	3	3	21	4
Alopecuris	4	0	0	4	0
Arrhenatherum	2	2	2	0	6
Brachypodium	5	5	3	0	8
Bromus	117	40	35	70	88
Calamagrostis	6	0	0	4	0
Cynosurus	1	0	1	1	0
Dactylis	119	60	60	58	179
Echinochloa	2	2	0	0	0
Elymus	4	0	1	1	0
Euchlenea	1	1	0	0	6
Festuca	41	19	26	20	41
Helianthus	133	131	0	0	19
Helianthus (Sunchoke)	3	0	3	0	12
Hordeum	8	0	1	8	0
Lolium	40	28	5	12	43
Panicum	84	67	1	13	109
Phalaris	40	37	7	3	33
Phleum	35	8	7	24	2
Poa	33	5	9	26	2
Rottboellia	1	0	0	1	0
Setaria	41	25	0	14	1
Sorghum almum	9	6	0	3	36
Stipa	13	1	2	5	0
Zea	957	866	0	11	504
Totals: Genera 27	1853	1386	199	341	1286

Group I. Legumes.

Genera	No. accessions (cumulative) Received	Increased	Established	1954 Production	1953 Distribution
Astragalus	12	3	5	6	13
Coronilla	8	0	2	4	0
Hedysarum	2	0	2	2	0
Lathyrus	50	46	0	1	35
Lens	9	9	0	0	0
Lotus	24	10	7	14	56
Lupine	6	0	0	6	6
Medicago	189	119	127	69	166
Melilotus	101	47	68	53	43
Onobrychis	18	5	7	10	19
Ornithopis	2	2	0	0	2
Scorpiurus	1	1	0	0	4
Thermopsis	1	1	1	0	3
Trifolium	96	60	59	33	69
Trigonella	58	48	0	6	48
Vicia	13	5	0	7	13
Totals: Genera 16	590	356	278	211	477

Table 1.
Group II. Fruits and Vegetables.

Genera	No. accessions (cumulative)			1954	1953
	Received	Increased	Established	Production	Distribution
Allium	225	131	38	7	107
Apium	55	32	14	1	31
Asparagus	13	0	8	2	0
Beta	154	97	46	9	13
Cucumis	271	228	0	16	308
Cucurbita	451	365	0	29	128
Daucus	133	95	19	2	0
Fragaria	10	0	0	7	0
Lactuca	168	101	0	24	0
Lycopersicon	1178	1153	8	24	501
Malus	3	0	3	0	0
Phaseolus	1405	899	0	119	604
Pisum	549	417	0	116	596
Prunus	13	0	2	0	0
Pyrus	2	0	1	1	0
Rubus	32	0	15	13	0
Spinacia	135	113	0	17	1
Total Genera: 17	4797	3631	154	387	2289

Table 1.
Group III. Ornamental, Oil and Special Crops.

Genera	No. accessions (cumulative)			1954	1953
	Received	Increased	Established	Production	Distribution
Abelia	3	0	3	0	2
Acer	2	0	2	0	0
Amaranthus	2	2	0	0	3
Anethum	54	50	0	1	1
Antemis	1	0	0	1	0
Antirrhinum	1	1	0	0	1
Atriplex	1	1	0	0	2
Barbarea	1	1	0	0	0
Betula	5	0	4	1	0
Calendula	1	1	0	0	1
Calicarpa	1	0	1	0	0
Camelina	8	8	0	0	8
Ceanothus	1	0	1	0	0
Chrysanthemum	3	2	0	0	0
Cichorium	2	2	0	0	1
Clethra	1	0	1	0	1
Coriandrum	19	17	0	1	0
Cuminum	10	8	0	0	0
Cyrilla	1	0	1	0	0
Delphinium	1	1	0	0	0
Deutzia	1	0	1	0	3
Dianthus	5	5	0	0	2
Diervilla	1	0	1	0	0
Eruca	15	14	0	0	1
Euphorbia	1	0	1	0	1
Glycorrhiza	1	1	0	0	0
Hedera	1	0	1	0	1
Heliopsis	1	1	0	0	2
Ilex	2	0	2	0	0
Impatiens	1	1	0	0	0
Ipomoea	3	3	0	0	0

Table 1.
Group III. Ornamental, Oil and Special Crops. Concluded.

Genera	No. accessions (cumulative) Received	Increased	Established	1954 Production	1953 Distribution
Larix	1	0	1	0	0
Lepidium	59	53	0	3	2
Ligusticum	3	0	3	0	0
Liriope	1	0	1	0	0
Mentha	7	4	3	0	0
Metasequoia	1	0	1	0	0
Millettia	1	0	1	0	0
Momordica	1	0	0	1	0
Nigella	28	25	0	1	0
Ocimum	15	14	0	0	2
Petunia	1	1	0	0	0
Phlox	2	0	0	1	0
Physalis	15	5	0	7	1
Picris	1	1	0	0	0
Pimpinella	14	8	0	3	0
Pinus	3	0	0	2	0
Populus	2	0	2	0	0
Portulaca	33	33	0	0	2
Quercus	1	0	0	1	7
Rheum	2	1	0	0	0
Rosa	3	0	1	0	1
Rumex	34	34	0	0	0
Satureja	3	3	0	0	0
Sempervivum	1	0	1	0	0
Stachys	1	0	1	0	0
Tagetes	3	3	0	0	0
Thuja	1	0	0	1	1
Zantedeschia	1	0	1	0	0
Zinnia	2	1	0	0	1
Totals Genera: 60	390	305	35	24	47

Table 1a. Summary Cumulative Total Number of Accessions Received; Increased; Established; To grow 1954 and Distributed during Calendar Year 1953.

Group	Genera	Accessions Received	Increased	Established	1954 Production	1953 Distribution
I. Grasses and Field Crops	27	1853	1386	199	341	1286
I. Legumes	16	590	356	278	211	477
II. Fruits and Vegetables	17	4797	3631	154	387	2289
III. Ornamental, Oil and Special Crops	60	390	305	35	24	47
Grand Total	120	7630	5678	666	963	4099

Table 2 that follows is a cumulative summary of accessions received; increased; failed; or reassigned to other regions for maintenance.

Plant accessions that fail to become established or produce seed at the Primary Station are reported to Washington for clarification of records or for re-distribution to a region having adapted soil and climate. It should be stressed that about one-half of the accessions returned to Washington may be desirable introductions if grown under more favorable environmental conditions.

Table 2 accounts for accessions of crops that have been transferred from the North Central to other regions for seed increase and maintenance.

Perhaps a word of explanation should be given to assist the reader in the interpretation of data presented in Tables 1 and 2. Table 1 is essentially a statistical cumulative summary of plant accessions received and successfully grown at the Primary Station. Table 2 is essentially a cumulative summary of accessions received and those that have failed at the Primary Station and have subsequently been transferred to the Washington office or transferred to other regions for seed increase and maintenance.

For example Agropyron is reported in both tables. 72 accessions having been received; 31 accessions increased successfully; 33 accessions to be grown in 1954; and 8 accessions returned to Washington having failed to become established or to produce seed at the Primary Station.

Andropogon appears only in Table 2 with a total of 24 accessions received and all of these transferred to the Southern Region for future seed increase and maintenance.

Approximately 50 percent of the genera of Group III Ornamental, Oil and Special Crops of Table 2 failed to become established or produce seed at the Primary Station. Perhaps this should be anticipated since many of these crops are new and previously not widely grown in the United States, but the percentage of failure is much greater than for any of the other crop groups.

Table 2. Cumulative Total of Accessions Received; Increased; and Number Failed with Assignment to Washington and Respective Regions for Maintenance.

Group I. Grasses and Field Crops.

Genera	No. accessions (cumulative): Received	Increased	No. accessions transferred: Wash.	S-9	W-6	IR-1
Agropyron	72	31	8	0	0	0
Andropogon	24	24	0	24	0	0
Avena	1	1	1	0	0	0
Bouteloua	2	2	1	1	0	0
Briza	1	1	0	1	0	0
Bromus	117	40	7	0	0	0
Bromus catharticus	31	31	31	0	0	0
Calamagrostis	6	0	2	0	0	0
Chrysopogon	2	0	2	0	0	0
Dactylis	119	60	1	0	0	0
Elymus	4	0	3	0	0	0
Festuca	41	19	2	0	0	0
Haynaldia	2	0	0	2	0	0
Helianthus	133	131	2	0	0	0
Holcus	1	1	0	1	0	0
Linum	1	1	1	0	0	0
Panicum	84	67	4	0	0	0
Phleum	35	8	3	0	0	0
Poa	33	5	2	0	0	0
Secale	1	1	1	0	0	0
Setaria	41	25	2	0	0	0
Sorghum	175	175	0	175	0	0
Stipa	13	1	7	0	0	0
Trisetum	1	1	0	1	0	0
Zea	957	866	80	0	0	0
Totals: Genera 25	1897	1491	160	205	0	0

Table 2. Group I. Legumes.

Genera	No. accessions (cumulative): Received	Increased	No. accessions transferred: Wash.	S-9	W-6	IR-1
Astragalus	12	3	3	0	0	0
Cajanus	1	1	0	1	0	0
Canavalia	1	1	0	1	0	0
Cassia	3	0	0	3	0	0
Coronilla	8	0	4	0	0	0
Crotolaria	2	0	0	2	0	0
Cyamopsis	22	22	0	22	0	0
Desmodium	1	0	0	1	0	0
Dolichos	2	0	0	2	0	0
Glycine	1	0	1	0	0	0
Indogifera	1	0	0	1	0	0
Lathyrus	50	46	3	0	0	0
Medicago	189	119	1	0	0	0
Melilotus	101	47	1	0	0	0
Onobrychis	18	5	3	0	0	0
Pueraria	1	0	0	1	0	0
Stilzolobium	3	0	0	3	0	0
Tephrosia	1	0	1	0	0	0
Trifolium	96	60	3	0	0	0
Trigonella	58	48	4	0	0	0
Vicia	13	5	1	0	0	0
Totals Genera: 21	584	357	25	37	0	0

Table 2.
Group II. Fruits and Vegetables.

Genera	No. accessions (cumulative): Received	Increased	No. accessions transferred: Wash.	S-9	W-6	IR-1
Abelmoschus	4	0	0	4	0	0
Allium	225	131	49	0	0	0
Apium	55	32	8	0	0	0
Asparagus	13	0	3	0	0	0
Beta	154	97	2	0	0	0
Brassica	294	0	0	294	0	0
Capsicum	382	0	14	368	0	0
Citrullus	338	0	0	338	0	0
Cucumis sativus	271	228	27	0	0	0
Cucumis melo	524	0	1	523	0	0
Cucurbita	451	365	57	0	0	0
Daucus	133	95	17	0	0	0
Fragaria	10	0	3	0	0	0
Lactuca	168	101	43	0	0	0
Lycopersicon	1178	1153	1	0	0	0
Pastinaca	1	0	1	0	0	0
Petroselinum	82	0	2	80	0	0
Phaseolus	1405	899	387	0	0	0
Pisum	549	417	16	0	0	0
Prunus	13	0	11	0	0	0
Raphanus	216	0	0	216	0	0
Rubus	32	0	4	0	0	0
Solanum melongena	192	0	6	186	0	0
Solanum sp.	81	0	6	0	0	75
Spinacia	135	113	5	0	0	0
Vaccinium	2	0	2	0	0	0
Totals Genera: 27	6908	3631	665	2009	0	75

Table 2.
Group III. Ornamental, Oil and Special Crops.

Genera	No. accessions (cumulative): Received	Increased	No. accessions transferred: Wash.	S-9	W-6	IR-1
Abies	3	0	3	0	0	0
Ageratum	1	0	1	0	0	0
Albizzia	1	0	1	0	0	0
Anethum	54	50	3	0	0	0
Arracacia	1	0	1	0	0	0
Carthamus	108	0	0	0	108	0
Cedrus	1	0	1	0	0	0
Chrysanthemum	3	2	1	0	0	0
Coriandrum	19	17	1	0	0	0
Cuminum	10	8	2	0	0	0
Cyclanthera	1	0	1	0	0	0
Cyphomandra	4	0	4	0	0	0
Dahlia	1	0	1	0	0	0
Eruca	15	14	1	0	0	0
Erotia	1	0	1	0	0	0
Girardinia	2	0	2	0	0	0
Gladiolus	4	0	4	0	0	0
Hibiscus	14	0	14	0	0	0
Lepidium	59	53	3	0	0	0
Nigella	28	25	2	0	0	0

Table 2.
Group III. Ornamental, Oil and Special Crops, Concluded.

Genera	No. accessions (cumulative)		No. accessions transferred			
	Received	Increased	Wash.	S-9	W-6	IR-1
Ocimum	15	14	1	0	0	0
Pachyrhizus	1	0	1	0	0	0
Papaver	52	52	52	0	0	0
Perilla	15	0	9	6	0	0
Phlox	2	0	1	0	0	0
Physalis	15	5	3	0	0	0
Picea	1	0	1	0	0	0
Pimpinella	14	8	3	0	0	0
Pinus	3	0	1	0	0	0
Psophocarpus	1	0	1	0	0	0
Rheum	2	1	1	0	0	0
Richinus	19	0	0	19	0	0
Rosa	3	0	2	0	0	0
Salvia	1	0	1	0	0	0
Sesamum	89	0	0	89	0	0
Smilax	2	0	2	0	0	0
Tulipa	1	0	1	0	0	0
Vellozia	1	0	1	0	0	0
Zinnia	2	1	1	0	0	0
Zizyphus	2	0	2	0	0	0
Totals Genera: 41	571	250	131	114	108	0

Summary of Table 2.

Group	Genera	No. accessions (cumulative)		No. accessions transferred			
		Received	Increased	Wash.	S-9	W-6	IR-1
I. Grasses and Field Crops	25	1897	1491	160	205	0	0
I. Legumes	21	584	357	25	37	0	0
II. Fruits and Vegetables	27	6908	3631	665	2009	0	75
III. Ornamental, Oil and Special Crops	41	571	250	131	114	108	0
Totals	114	9960	5729	981	2365	108	75

National Coordinating Committee Meeting

The National Coordinating Committee meeting held at Denver, Colorado, May 12-13, 1953 was attended by representatives from all Experiment Station Regions. Representatives from the North Central Region distributed copies of the minutes of the National Coordinating Committee to members of the Regional Technical Committee and also presented a full discussion of the Denver meeting to the NC-7 committee at their meeting at Ames, Iowa, on September 11-12, 1953.

Regional Technical Committee

The states of Indiana, Kansas, Minnesota and Nebraska made Technical Committee membership changes during the 1953 calendar year. The Regional Project NC-7 welcomes these new committee members and extends to our former committee associates our thanks and appreciation for their helpful support and assistance during the formative years of the New Crops Regional Project.

The Technical Committee for NC-7 held its Eighth meeting at Ames, Iowa, September 11-12, 1953. The minutes of this meeting have been distributed and contain a report of committee transactions and recommendations relative to the project budget for the coming year and suggestions for changes in the operations program of the project. The most significant changes relate to the NC-7 support for growing and preserving seed stocks of open-pollinated varieties of corn. As the need arises, seed stocks of open-pollinated varieties will be maintained by a seed growing contract developed between the Primary Station and the State Experiment Station that originated the stocks. The cost of production will be based upon an agreed per accession basis between the Coordinator and the Research Project leaders. Prior to this change the states of Missouri, Kansas, Nebraska and North Dakota received NC-7 funds in support of the program for maintaining seed stocks of open-pollinated varieties in their respective states.

The Technical Committee also recommended the initiation of the project entitled "Woody Ornamental and Shelter Plants for the Prairie Areas of the North Central Region." A sub-committee consisting of representatives from the Horticultural Departments of the Experiment Stations of Missouri, Kansas, Nebraska, South Dakota, North Dakota, Minnesota and Iowa have prepared a project outline and progress is being made toward the initiation of field work during the present fiscal year. The NC-7 Technical Committee has recommended that the probable saving in funds from changes in present projects related to Corn preservation, Stone fruits and Wheat diseases should permit initiation of the field work following completion of the project outline. The sub-committee met at Brookings, South Dakota, on January 20, 1954.

Domestic Plant Exploration During the 1953 Calendar Year

The Plant Introduction Section of the Agricultural Research Service conducted two expeditions for the collection of native grasses and legumes in the North Central Region during late summer and early fall months.

One group of collectors conducted field work in the state of Nebraska; the second group made collections in Kansas and other locations in the Southern Great Plains.

Approximately 1000 accessions have been added to the inventory of native forage species in each state as the result of these field collections.

The 9B-3 funds used in support of formal projects in the states of Kansas and Nebraska will be used in the screening and evaluation of these introductions.

Report of Progress 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 Chromosomal Tester Stocks in Maize. $2500 annually starting 7-1-53.

Approximately 1100 cultures of maize stocks were assembled at Urbana during the first year of this project. Nearly 7000 pollinations were made in the conversion of these stocks to inbred lines M14, W23, and Oh51a and in sib-pollinations for increase of seed. A list with description of available genetic stocks is now being prepared.

Although this project for maintaining genetic and chromosomal testers is the only activated project of the Illinois Experiment Station receiving 9B-3 assistance, Experiment station staff members are screening and evaluating tomatoes, castor beans, broom corn, soybean and forage legumes obtained from the inventory of plants produced at the Primary Station.

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

At the request of the Director of the Indiana Experiment Station and the research leader for this project, 9B-3 funds were not used during the present fiscal year in support of this work.

The NC-7 Technical Committee has recommended that the Primary Station initiate the Woody Ornamental and Shelter Plants project this fiscal year by making use of the $1000 formerly assigned and used in support of the Indiana project.

Iowa:

The Iowa Experiment Station has no formal project receiving NC-7 assistance except the Primary Plant Introduction Station. The Experiment Station has a Research Project with objectives similar to those of NC-7 in which plant using divisions of the Experiment Station cooperate. Plant materials and information concerning their performance are freely exchanged between the Primary Station and Experiment station research staff. The Experiment Station also cooperates with the Regional Project in the furnishing of land and use of buildings.

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

The major objectives of this project relate to the improvement and possible development of new native forage varieties of Andropogon furcatus, Andropogon scoparius, Sorghastrum nutans, Panicum virgatum, Eragrostis trichodes and Andropogon hallii.

Nearly 550 accessions of these six native forage species have been retained for careful study and evaluation in the continuing process of forage strain building. The 1951 plantings have supplied 288, the 1952

plantings 115 and the 1953 plantings contributed 143 accessions.

This research program will be augmented in 1954 and later years by selections of native forage species obtained during the late summer and fall months of 1953 from collections made by Kansas station workers supported by the Plant Introduction Section of the Agricultural Research Service.

Kansas: Maintenance of Viable Seed of Open-pollinated Corn Varieties.

When this project was initiated the collection consisted of 120 varieties or strains that had undergone selection in Kansas for a number of generations.

The first activity was to produce fresh seed of the varieties before their viability was gone. At the same time the varieties were being studied in the Kansas corn breeding project to evaluate them as potential sources of germplasm. On the basis of the evaluation 37 strains are being maintained by controlled sibbing as distinct cultures. Pound samples of 33 of these are now in storage at the regional station in Ames, Iowa, and new seed of the other four was produced in 1953.

Sixty-eight of the strains have been grouped into six composites that are maintained by growing in isolation with open pollination. These composites are:

1. Hays Golden Type	12 strains
2. Early White	12 strains
3. Reid Type	12 strains
4. Midland Type	12 strains
5. Late White	13 strains
6. Blue and White	7 strains

This project in its present form will be completed at the close of the present fiscal year. As the need arises open-pollinated varieties of corn will be maintained on a per accession cost basis by contract between the Primary Station and the Project Leader of the Experiment Station wishing to increase a given variety or strain.

Michigan:

The Michigan Experiment Station does not have active formal projects receiving NC-7 assistance. Michigan Experiment Station staff members continue to receive plant materials from the inventory of seed stocks maintained by the Primary Station.

Minnesota: Testing Newly Introduced Plants for Susceptibility or Resistance to Disease.
$1000 annually since July 1, 1947.

A group of 1300 spring wheat varieties and selections from Mexico, Canada, South America, State Experiment Stations and Introductions by the Department of Agriculture have been assembled for evaluation in accordance with the objectives of this project. These accessions were grown in a disease garden plot which has been in wheat for over 30 years.

Field notes were taken of the reaction of all the material to infections of loose smut, leaf spots, viruses, stem rust and leaf rust and insect infestations of June bill bug and stem maggot. One hundred eighteen individual plant selections were made on the basis of their resistance to one or more diseases and pests.

The NC-7 Technical Committee recommended the continuation of support for this project for the next fiscal year on a reduced basis. It is planned to continue the nature of the evaluation work in the same manner as that for previous years.

Minnesota: Introduction, Preservation and Evaluation of Stone Fruits of Probable Potential Value in the North Central Region.
$1000 annually since July 1, 1950.

Nearly 750 accessions of stone fruit species have been assembled by the Division of Horticulture of the Minnesota Experiment Station as related to the objectives of this project. The present inventory includes: Plums 378; Cherry-plums 75; Apricots 115; Cherries 81; Peach and Almond 98.

These accessions are being studied for their respective qualities for breeding purposes and this information is reported in the Regional Breeders Stocks Inventory.

Research workers on stone fruit viruses have received a list of the species and varieties of stone fruits on the inventory of available stocks and a number of requests for propagating wood have come from within and outside of the Region.

Missouri: Preservation of Viable Seed Stocks of Open-Pollinated Varieties of Corn Adapted to Missouri and Adjoining States.
$500 annually since July 1, 1952.

Approximately 15 open-pollinated varieties of corn were grown during 1953 and the increase seed placed in storage at the Primary Station at Ames for preservation.

During the year 50 recent corn introductions were crossed with Argentine Waxy and the F_1 backcrossed to the Waxy parent. These progeny are being analyzed by the Peoria Laboratory for amylose differences. Additional corn introductions are being evaluated by the Missouri Experiment Station in special studies concerning protein quality.

The Department of Genetics at the University has made use of all corn introductions on the Primary Station inventory in research studies concerned with plant and aleurone color. Dr. Stadler, research leader, has requested and received permission to extend these examinations to all samples of corn now in the storage of the Plant Introduction Section at the Glenn Dale, Maryland, Plant Introduction Garden. These corn accessions, having their origin in Mexico, Central America and Brazil will greatly extend the diversity of the gene base now available to research workers with corn.

Nebraska: Preservation of Alfalfa Clones and Seed Stocks Needed in Alfalfa Improvement.
$500 annually since July 1, 1949.

The alfalfa program of the Nebraska Experiment Station concerned with this project involves the screening and evaluation of new introductions for winter hardiness, disease and insect resistance, comparative yield and economic values and other characters of value for breeding purposes. In addition, the 9B-3 funds are used to assist in the evaluation and maintenance of alfalfa conference clones that are being studied intensively by alfalfa

research workers throughout the United States. The Permanent Clonal Nursery consists of 128 "C" or Conference Clones, 283 selected clones, 40 of which were added in 1953.

This collection of alfalfa introductions, strains and varieties represents a very extensive collection of germplasm. Requests for cuttings made from this nursery are obtained from workers in all regions of the United States.

Nebraska: Preservation of Viable Seed Stocks of Open-Pollinated Regional Strains of Corn Varieties.
$600 annually since July 1, 1950.

The primary objective of this project is to preserve viable seed stocks of locally adapted open-pollinated varietal strains of corn which may be used as sources of new germplasm in the corn improvement program. More than 100 varietal strains have been composited on the basis of geographical origin into some 14 lots. The 9B-3 funds received from Regional Project NC-7 are used to cover in part the cost of renewal of these composite lots along with a selected number of distinct varieties.

The NC-7 Technical Committee has recommended that this project should be completed this fiscal year but that seed increase of open-pollinated strains or varieties when required in the future should be made on the basis of a contract based upon an agreed cost per accession. The Primary Station will be responsible for developing these contract arrangements with the Experiment Station.

Nebraska: Preservation and Preliminary Evaluation of Important Native and Introduced Grasses Considered Valuable in Improvement for Forage and Observation Purposes.
$1200 annually since July 1, 1949.

The objectives of this project are the introduction of new breeding stocks of grasses and their maintenance and determination of value for breeding and improvement of new forage varieties.

The introductions of native species obtained from domestic collections made throughout the state in 1949 have now progressed to the advanced stages in the breeder's nursery. A new nursery of 500 grass clones resulting from domestic exploration in Nebraska was established with plants moved from different areas of the state during August through September 1953. Seed of additional accessions of native species made during this same period will be added to the inventory of forage materials in the breeding and improvement program. Maintenance of a wide range of breeding stocks of important perennial grasses is an important consideration in a breeding and improvement program.

Foundation seed fields of intermediate wheatgrass, tall wheatgrass, sideoats grama, switch grass and sand lovegrass are maintained by the Nebraska Experiment Station and comprise the end product of the forage breeding and improvement research work.

North Dakota: Preservation of Certain Physiologic Races of Flax Rust (Melampsora lini).
$500 annually since July 1, 1950.

The 50 physiologic races of flax rust that identify the rust conditioning genes in flax were maintained by propagation on their selective hosts during the winter months. The urediospores were stored in cork stoppered glass vials at 8°F. during the summer.

The races were used to identify the F_1 plants carrying the resistant gene in backcrosses to Bison of 36 varieties and lines of flax. These plants are the second to the eighth backcross. The objective is to secure lines (isogenic) possessing each of the rust-conditioning genes found in flax and which have the agronomic type and disease reaction (other than rust) of Bison. Such a series of rust differentials should facilitate (a) the development of new rust-resistant varieties of flax, (b) studies of the genetics of pathogenicity in the flax rust fungus, (c) studies of the physiology of rust reaction in the host, and (d) studies on the role of pathogenic gehotype of the fungus in epidemiology.

North Dakota: Preservation of Viable Seed Stocks of Open-pollinated Strains or Varieties of Corn Grown in the Northern Great Plains.
$500 annually since July 1, 1949.

Seed lots of 67 strains were processed and stored in moisture-proof containers. The seed supply of some varieties amounts up to 5 pounds while in other varieties the amount of seed is only 500 to 600 kernels. Twenty-three varieties were grown, descriptive data recorded and the seed increased by sib pollination. Due to adverse weather, during the pollination season, the seed set of early maturing varieties was very poor. In some of these the seed supply is critically low. The seed set for late maturing varieties was very good.

About 80 seed lots were supplied, upon request, to the research agencies in the United States and five foreign requests, 30 seed lots were also filled. The purposes for which the seed was used were genetic study, search for drought-tolerance, disease resistance, early maturity character, decorative planting.

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 July 1, 1949.

More than 1100 accessions of wild and domestic species of tomato have been evaluated for vine and fruit characters and for resistance to certain diseases. The classification and evaluation work was done at Wooster, Ohio. Seed was increased at Wooster and at Ames, Iowa. In addition, nearly 50 workers in other Experiment Stations, Canadian Department of Agriculture and private agencies cooperated in the testing of 144 accessions of the wild species for resistance to 15 diseases, crack resistance and frost tolerance.

The results of these cooperative research studies are being assembled for publication.

Ohio: The Multiplication, Preservation and Determination of Potential Value of Pear Varieties for North Central States Introduced and Collected Within the United States.
$500 annually since July 1, 1949.

Over 145 varieties and seedlings of pear (Pyrus communis) and hybrids of oriental and European origin are growing in orchards and are being evaluated with respect to fruit characters as they are coming into bearing. All varieties seem to be compatible on Old Home, and budding of varieties and new introductions on Old Home was continued during the past summer.

Certain varieties have exhibited reasonably high dessert quality. Among these being Beierschmitt, Beurre Du Mont, Caywood, Dana Honey, Doyenne Georges Boucher (PI 131486), Early Seckel, Ewart, Laxton's Progress (PI 127039), Robert de Neufville (PI 125739) and Smythe.

South Dakota: The collecting, Preserving, Cataloging, Propagating and Testing of Fruit Plants Having Potential Genetic Value. $2500 annually since July 1, 1947.

This project primarily concerns the propagation, establishment and maintenance of a collection of Horticultural species from Siberia, Russia and North China originally assembled by the late Dr. N. E. Hansen.

The assembling phase of the work has been largely completed with the establishment of a four-acre Memorial Orchard on the Brookings, South Dakota campus.

In addition to maintenance of a foundation orchard of exotic fruit plants, evaluation of this material for its genetic use has received major attention. Three selections from this material are used as root stocks. Apple varieties grafted on these roots are beginning to bear fruit. A marked difference in shape of tree is to be observed on these different root stocks. Scions, root stocks and seedlings have been supplied to experiment stations desiring them.

This is perhaps the greatest collection of hardy fruit plants in the country. It serves as a "bank" of genetic material for all stations of the region. Scab resistance in Alexis, Dolg and Jonsib crabapples, fire blight resistance in several pears, winter hardiness in many apples and pears, and good root stocks have been recorded as characteristics of value to horticulturists that have resulted from these studies.

Wisconsin:

The Wisconsin Experiment Station does not have formal projects that receive NC-7 assistance. However, many plant accessions carried on the Primary Station inventory have been used by research workers of the Wisconsin Experiment Station in conducting their research program.

The annual report for the 1952 Calendar year cited progress with more than 15 crops that are being used in this manner and show promise for improvement of present varieties. This type of research has been continued during the calendar year of 1953.

Additional information concerning performance of certain recent introductions and their probable role in plant improvement are cited in a following section of this report.

4. APPLICATION OF RESULTS AND BENEFITS REALIZED.

Plant materials made available to research workers through Regional Project NC-7 are finding increasingly important use in plant breeding programs. The time needed for testing and evaluation of introductions may require many years as illustrated by examples provided in a report by Dr. L.C. Newell of the Nebraska Experiment Station entitled "Historical background, origin and adaptation of important wheat grasses introduced into North America."

PI 98568 Agropyron intermedium. Introduced from USSR in April 1932 as Agropyron pungens. Nebraska now grows 8400 acres of this accession and 145,000 acres were reported as the production in the United States for 1952.

PI 98526 Agropyron elongatum. Tall wheat grass introduced from USSR in April 1932 and has now reached an acreage of 8500 within the state of Nebraska and 114,000 acres within the United States. It is noted that the acreage reported from southwestern United States has developed largely from the increase of an introduction PI 109452 obtained from Turkey in 1934.

It is significant that more than 20 years was required for these introductions to reach their present place of usefulness as forage species.

Dr. R. A. Brink reports that one-quarter of the parentage of Vernal, a new alfalfa variety released by the Wisconsin station during the past year, traces to a wild diploid (2n = 16 chromosomes), Medicago falcata.

The wild alfalfa parent was rather small and unpromising in appearance from the standpoint of use in breeding a commercial strain. It gave very vigorous hybrids when crossed with certain wilt resistant selections and is considered responsible for the superior winter hardiness and dark green color of the new variety, Vernal. Dr. Brink suggests that this and other wild Medicago falcata types possess germplasm that is unique to the group and which may not be represented in the standard commercial varieties.

Again it is significant that the introductions of the Medicago falcata types occurred more than 20 years ago and successive steps of observation, evaluation, recombination and comparative testing have only now resulted in the development and release of this new variety by the Experiment Station.

There are however examples available where a new introduction appears to fit immediately into a use program and in such instances the attention of the investigator is directed toward the placement of these materials into agricultural use while at the same time a detailed research program looking toward their improvement is in progress. Three such recent introductions were reported by the Wisconsin Experiment Station during the past year as follows:

PI 197677 Graplopetalum sp. introduced from Mexico in 1951 is reported as a type of plant very useful in the commercial florist industry for use in planters and similar arrangements. This introduction has been easy of culture, propagates readily, foliage and form are interesting and some plants have flowered during the first year of observation. All of these qualities make the plant a welcome addition to those now available to the commercial florist industry.

PI 205708 Anthurium sp. introduced from Guatemala in 1953. As the result of but one year's observation this introduction, a rapid growing vine, possesses

many qualities that might make it of value in the commercial florist industry as a "greens plant" or foliage plant. The introduction grows rapidly, leaves are a good green color and older leaves persist well. Further observations will be made from stock plants now under propagation.

T. I. 245 is a tobacco accession from South America introduced during the 1930's that apparently has resistance to cucumber mosaic and other viruses. Although this is an introduction obtained by the Plant Introduction Section, the accession number reported is that of the Tobacco, Medicinal and Special Crops Section that has been conducting the research studies with this introduction.

5. WORK PLANNED FOR NEXT YEAR.

As recommended by the NC-7 Technical Committee, the procedure to be followed with the corn projects concerned with the maintenance of open-pollinated varieties will be changed to a per accession cost basis for the increase of seed. The Primary Station will be responsible for developing these contract arrangements with the Experiment Stations where the open-pollinated varieties were developed.

This change in procedure will bring to a close the present arrangement for maintenance of open-pollinated varieties of corn in the states of Missouri, Kansas, Nebraska and North Dakota.

The NC-7 Technical Committee has recommended activation this fiscal year of the project entitled "Woody Ornamental and Shelter Plants for the Prairie Areas of the North Central Region."

A sub-committee of Horticultural representatives from the seven western states of the North Central Region has prepared a project outline and is working out the technical details of woody species and procedures that may be used regionally in the conduct of this work. The Technical Committee recommended that the Primary Station use the 9B-3 funds reverting to the North Central Region due to the discontinuance of the Indiana project concerned with the "Collection, Preservation, and Testing of Prunus for Cherry Leaf Spot (Coccomyces sp.) resistance."

The seed increase and initial evaluation program at the Primary Station is expected to continue at about the same volume as during the past six years whereby approximately 30 acres of land are utilized. Summary Table 1a presents the anticipated number of introductions for seed increase in 1954 as 963. This number will be increased by the number of "Re-grows" now in our seed list that require replacement due to depletion of seed stock and also increased by the number of accessions of new introductions received between January 1, 1954, and the normal seasonal date of planting. We therefore anticipate a field production of 1954 of about 1200 accessions. This is about the average level of our seed production since the Primary Station was started.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR.

Mimeograph of the 1953 seed list of plant materials available under the Regional Project NC-7. This seed list is cumulative and shows more than 5600 items that have been increased and given initial evaluation at the Primary Station.

Publication of two years screening data obtained through the cooperation of approximately 50 pathologists working with 20 diseases of 144 accessions of wild species of tomato.

Publication of the Roster of Research Workers of the North Central Region and the crops in which each 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 Plant Introduction Section.

7. APPROVED:

L. L. Smith
Chairman, Technical Committee

W. W. Lambert
Regional Administrative Adviser