

ANNUAL REPORT OF COOPERATIVE REGIONAL PROJECTS
Supported by Allotments of the Regional Research Fund,
Hatch Act, as Amended August 11, 1955
January 1 to December 31, 1981

1. PROJECT: NORTH CENTRAL REGIONAL PROJECT NC-7
Introduction, Multiplication, Evaluation, Preservation, Cataloguing, and Utilization of Plant Germplasm

2. COOPERATING AGENCIES AND PRINCIPAL LEADERS:

<u>Administrative Adviser</u>	R. W. Hougas, Wisconsin
<u>Regional Coordinator</u>	W. H. Skrdla, Iowa
<u>State Experiment Stations and Representatives</u>	
Alaska	*R. L. Taylor Missouri *L. E. Cavanah
Illinois	*T. Hymowitz, Chmn Nebraska H. Williams
Indiana	*J. Janick North Dakota *J. D. Franckowiak
Iowa	*I. T. Carlson Ohio *S. Z. Berry, Secy
Kansas	*C. E. Wassom South Dakota *R. M. Peterson
Michigan	*R. L. Andersen Wisconsin G. H. Gabelman
Minnesota	*H. Pellett

U. S. Department of Agriculture

ARS Germplasm Resources Laboratory	*G. A. White
ARS National Program Staff	Q. Jones
ARS Area Director, Mid-Great Plains Area	C. W. Alexander
Cooperative State Research Service	C. O. Grogan
Soil Conservation Service	*K. Blan
Northern Regional Research Center	*L. H. Princen

*Voting Members of NC-7 Technical Committee

North Central Regional Plant Introduction Station, Ames, Iowa

Regional Coordinator	W. H. Skrdla
Horticulturist	H. S. Bhella
Research Plant Pathologist	R. L. Clark
Research Entomologist	R. L. Wilson

3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

a. Introductions having special Value

Described below are plant introductions reported by cooperators in 1981 that are considered to have made important contributions to plant breeding programs and to U S. Agriculture.

(1) Grasses, legumes, field crops

(a) Alfalfa

1/ Alfalfa PI's 107298 (Turkey), 206278 (Turkey), and 217419 (Denmark) contributed germplasm to the cultivar "Perry" released jointly by the USDA, the Nebraska Kansas, South Dakota, and Wisconsin AES in 1980. (Crop Sci 21:349)

2/ In a replicated alfalfa variety test at Nebraska, forage yields of 53 plant introductions were expressed as percent of the average of five check varieties. The check varieties and their ratings are: Agate - 103; Arc - 102; Baker - 102; Riley - 100; and Vernal - 94. The following introductions rated 94 or better:

370686	USSR	106
237215	Uruguay	100
401466	Romania	98
286371	Turkey	97
1311643	Spain	97
1302927	Spain	96
410976	USSR	96
256004	France	95
286373	Czechoslovakia	95
31148	Spain	94
404217	USSR	94
410977	USSR	94

-Central Alfalfa Improvement Conference Report 1980

3/ In a test for comparing laboratory and field techniques to measure drought resistance in alfalfa seedlings, 1077 alfalfa plant introductions were used in the evaluations. Moisture stress was applied to germinating seeds and to developing seedlings in both, the laboratory and field. Data on certain morphological traits taken at Ames during seed increase of the alfalfa introductions, such as, (1) flower color, (2) pod shape, (3) growth habit, and (4) winter survival were made available for the evaluation. From the experiment it was concluded that morphological data from Ames were of greater value in predicting field stand and survival than were results on laboratory emergence and growth chamber survival under the conditions of the experiment. (Rumbaugh, Johnson, 1981. (Crop Sci. 21(5):709-713)

4/ Alfalfa PI 299046, Medicago coerulea from United States was used in a genetic study to determine the inheritance of disease resistance in diploid alfalfa, along with Wisconsin cultivated diploid alfalfa (CADL). The study was to determine the inheritance of resistance of two resistant M. coerulea plants and two susceptible CADL plants to Phytophthora root rot (PRR). Results show that resistance in M. coerulea was complex and that epistatic relationships might be important and also indicate the potential usefulness of diploid alfalfa as new sources of PRR. (Irwin, J. A. G., D. P. Maxwell, and E. T. Bingham. 1981. Inheritance of resistance to Phytophthora megasperma in diploid alfalfa. (Crop Sci. 21(2):271-276).

5/ The Peruvian alfalfas 247789 and 247790 were crossed to winter-hardy multipest clones. The resulting F1 population has undergone cycles of selection for plant hairyness, bacterial wilt resistance, anthracnose resistance and vigor. The hairyness contributed by these PI's has added significant leafhopper tolerance. (M. McCaslin. 1981 Act. Perf. Rep., WI).

6/ Alfalfa, Medicago falcata, 314579, 'Pavlosk 7' from USSR has given very vigorous F1 hybrids in crosses with multi-pest resistant alfalfa populations adapted to the North Central region. (M. McCaslin, 1981 Act. Perf. Rep., WI).

(b) Bromegrass

1/ Bromus rubens is susceptible to MDMV-B (Maize dwarf mosaic virus) but not to MDMV-A (1972, Tosic and Ford, Phytopathology 62:1466). "...It seems to be the only species with this characteristic and therefore very useful in keeping virus cultures from getting mixed." Heteranthelium piliferum was also reported to carry the same trait but in these tests it was infected by both viruses. (S. Jensen, 1981 Act. Perf. Rep. NE).

(c) Corn

1/ Corn PI's 218184, San Xavier from Arizona and 314844, Mammoth White Pearl from Missouri were used in formation of a new pipe corn breeding population. Cob qualities are suitable for pipe manufacturing. (L. Darrah, 1981 Act. Perf. Rep., MO).

2/ Corn PI 270297, an inbred line from Argentina, 41:2504B (Amargo) and received from the Corn Insects Research Laboratory, Ankeny, IA is reported to have the highest level of European corn borer (1st brood) resistance known and good 2nd brood resistance. (F. F. Dicke, 1981 Act. Perf. Rep., Pioneer Hi-Bred International, IA).

3/ Corn PI 340838 has good resistance to leaf freckles and wilt (Goss' wilt) bacterial disease, while PI's 340837 and 340850 have fair resistance. (W. A. Compton, 1981 Act. Perf. Rep., NE).

(d) Panicum

1/ Panicum milioides, PI 285220, is considered to have a photosynthetic carbon metabolism which is intermediate between those of C3 and C4 plants (S. Holaday, 1981 Act. Perf. Rep., NE).

(e) Sunflower

1/ Sunflower PI's 175733 (Turkey), 291411 (Hungary), 296292 (S. Africa), 343793 (Iran), and 413116 (California) were selected as being resistant to injury from the herbicide Diclofop at 2.2 Kg/ha postemergence. PI 296292 exhibited good tolerance (1980 Act. Perf. Rep.).

2/ Sunflower PI 287230, variety 'Enisej' from USSR, contributed germplasm to the inbred lines IS 7117 and IS 7118 in 1981. (M. Abdallah, 1981 Act. Perf. Rep., Interstate Seed Co., ND).

3/ Six sunflower accessions, 343794, 371936, 372254, 376216, 377530, and 380575, were reported to have significant levels of resistance to the new race 3 strain of sunflower downy mildew. (T. Gulya, 1981 Act. Perf. Rep., ND).

4/ Five sunflower accessions were found with appreciable levels of resistance against a composite of races 2 and 3 of sunflower downy mildew, PI's 343794, 372257, 376215, 376216, and 377530. (T. Gulya, 1981 Act. Perf. Rep., ND).

5/ Sunflower introductions were evaluated in 1980 and 1981, including resistant and susceptible entries. PI's 380562 and 172907 were rated in both years as the most resistant as compared to the check, hybrid 894. There was a highly significant negative correlation noted between flowering date and disease susceptibility, i.e., the later flowering accessions had less stalk rot. (T. Gulya, 1981 Act. Perf. Rep., ND).

(f) Wheatgrass

1/ Agropyron intermedium, PI 345586, 'Rostovskii 31' from the Rostov Region of USSR had better than average resistance to leaf spot caused by Helminthosporium sativum in a preliminary evaluation of a space-plant source population. In a subsequent disease study, average disease scores of single plants subjected to a natural infection in the field indicated that PI 345586 was more resistant than the cultivars 'Greenleaf' and 'Slate'. Further evaluation of disease reaction is in progress. (J. D. Berdahl, 1981 Act. Perf. Rep., ND).

(2) Vegetables

(a) Beans

1/ At Wisconsin, a study was made of the Globulin -1 (G1) protein, the major storage protein fraction of common bean, Phaseolus vulgaris L. Among the six parents grown in the field in 1977, PI 229815 produced the most G1 protein (136.5 mg G-1/g flour). It was low yielding, however, producing 13 g seed/plant compared to the highest yielding parent, 'Bonita', that produced 66 g seed/plant. (Crop Sci. 21:289-294).

2/ Five bean introductions, PI 209488, 209492, 3097158, 312068, 313454, showed resistance to Aphanomyces root rot in 1981 tests. (C. R. Grau, 1981 Act. Perf. Rep., WI).

(b) Beets

1/ In 1980, 166 lines of white beets (sugar) were evaluated on an

individual beet basis for percent sucrose by Dr. Larry Campbell at North Dakota State University. The following lines are among those having the highest sucrose content, in comparison with the check variety:

<u>PI No.</u>	<u>Source</u>	<u>%Sucrose</u>
220165	Afghanistan	15.0
274394	Poland	13.8
274393	Poland	13.2
169025	Turkey	13.1
266103	Poland	13.0
251042	Yugoslavia	12.8
355962	USSR	12.8
140356	Iran	12.6
355963	USSR	12.6
ACH-14 ---Check		13.6

(1980 Act. Perf. Rep.)

(c) Cucumbers

1/ Two cucumber introductions, PI's 200818 from Burma and 339241 from Turkey yielded plants relatively resistant to gummy stew blight Didymella bryoniae in experiments conducted at the Institute for Horticultural Plant Breeding (IVT), Wageningen, the Netherlands. (Euphytica 27(1978) :861-864).

2/ Cucumber PI's 308915 and 308916 from USSR carry the compact plant type trait (cp cp) but are very poor with respect to disease resistance and quality parameters. At Wisconsin this trait was transferred into populations with better disease resistance and fruit quality characteristics. In connection with this work, a study was made to determine if seed quality had been a problem associated with these accessions originally or if problems developed upon transfer of the compact trait into their genetic backgrounds. ". ..It was determined that both seed weight and "abnormal" seed shape characteristics of our population of compact plant types are not appreciably different from those of the accessions we obtained from you in November 1979. Apparently the seed shape and small size of "compact" seeds is associated with the locus conditioning the compact plant phenotype. Our program is currently involved in a recurrent selection program directed at improvement of seed emergence performance of compact (cp cp) genotypes of Cucumis sativus". (M. D. Edwards, 1981 Act. Perf. Rep. WI).

3/ Cucumber PI 227207, cv, 'Suyo' from Japan contributed to the variety 'Quebec Vert' released in Canada in 1974. (R. Doucet, 1981 Act. Perf. Rep., Canada).

4/ Cucumber PI's 188749 (Egypt), 188807 (Philippines), and 390260 (Japan) need more evaluation for possible tolerance to Triazine. (Diana Helsell, 1981 Act. Perf. Rep., MI).

(d) Peas

1/ Pisum sativum PI's 193586 and 193835 from Ethiopia were released as germplasm with resistance to pea seedborne mosaic virus. See 1971 Crop Sci. 11:945-956, 1973. Phytopathology 63:1130-1133; Crop Sci. 15:447-448, and registered in Nov. 1971. (E. I. Gritton, 1981 Act. Perf. Rep. WI).

(e) Pumpkin

1/ Cucurbita texana fruits, PI 285213 from Texas, were used in feeding behavior studies with adults of several species of rootworms, Diabrotica spp. These fruits contain bitter substances (cucurbitacins that act as patent feeding

stimulants for adult Diabrotica. Information gained from these studies will be published. (T. Branson, 1981 Act. Perf. Rep. SD).

(f) Tomato

1/ Tomato PI 235673, Lycopersicon esculentum from New York contributed germplasm to the variety 'Mini-Spartan' released by the Michigan AES. PI 235673 is a TMV resistant line received from Dr. F. O. Holmes. (Honma, S., H. C. Price, H. H. Murahishi, and C. L. Bedford. 1980. Mini-Spartan tomato. Michigan Agric. Expt. Sta. Res. Rpt. 399.) (TGC Report No. 31, pg. 43 appendix, 1981).

2/ Tomato PI 280597, L. esculentum from USSR, cv 'Maliutka', contributed germplasm to the varieties 'Short Red Cherry' and 'Royal Red Cherry' released by the University of California. PI 280597 has salad size fruit and set under low temperatures. (Jones, R. A., P. G. Smith, A. H. Millet, and K. A. Kimble. 1980. 'Royal Red Cherry' and 'Short Red Cherry' tomatoes. HortScience 15(1):98.) (TGC Report No. 31 pg. 44 appendix, 1981).

3/ Tomato PI's 124161, L. esculentum from Guatemala, and 126947, L. pimpinellifolium from Peru contributed germplasm to the Canadian varieties 'Ontario Pink 774' and 'Ontario Red 775' released in 1979. (Kerr, E. A. 1980. Ontario Ministry of Agriculture and Food. Correspondence with G. M. Rick dated 12/9/80 (TGC Report No. 31, pg. 44 appendix, 1981).

4/ Tomato (Lycopersicon hirsutum f. glabratum) PI 134417 from Ecuador was found to be very tolerant to Alternaria solani, with only very few leaf spots observed at the end of the 1981 season. It may have possible tolerance to another unidentified species of Alternaria. It was completely free of Septoria lycopersici. These observations were made in early blight resistance tests made in St. Hyacinthe, Province of Quebec, Canada. (Ltr. from R. Doucet, St. Hyacinthe 11/12/81).

5/ Tomato PI 263726 from Puerto Rico contributed germplasm to 'Quebec 1121' released by Canada in 1980. In previous years, it contributed to 8 other varieties: 'Canabec' (1967), 'Yorkbec' (1974), 'Usabec' (1974), 'Superbec' (1976), 'Ultrabec' (1976), 'Canabec Rose' (1976), 'Canabec Super' (1975), and 'Rosabec' (1975).

Tomato PI 250432, cv 'Olomoucke' from Czechoslovakia contributed germplasm to 3 varieties released in Canada: 'Precocibec' (1974), 'Maskabec' (1974), and 'Itabec' (1974).

Tomato PI 197159 from Guatemala contributed to the variety 'Petitebec' released in Canada in 1976. (R. Doucet, 1981 Act. Perf. Rep. Canada).

6/ Tomato PI 134417, Lycopersicon hirsutum f. glabratum from Ecuador was observed to be ". . .Very tolerant to Alternaria solani, only very few leaf spots observed at the end of season, and possibly another species of Alternaria (conidia observed not septate). Completely free of Septoria lycopersici. (R. Doucet, 1981 Act. Perf. Rep., Canada).

7/ Tomato, PI 270188, cv 'Globelle' from Ohio contains the gene cf-2 for resistance to Cladosporium fulvum, confirmed in 1981 tests. (E. A. Kerr, 1981 Act. Perf. Rep., Canada).

8/ Tomato PI's 124161 (Guatemala) and 126947 (Peru) contributed germplasm to the cultivars 'Ontario Pink 774' and 'Ontario Red 775' released in Canada. (E. A. Kerry, 1981 Act. Perf. Rep., Canada).

9/ Tomato, PI 370082 'Bay State' (originally from Canada) contains the gene cf-2 for resistance to Cladosporium fulvum, confirmed in 1981 tests. (E. A. Kerr, 1981 Act. Perf. Rep., Canada).

b. Accomplishments of the Regional Station and Regional Program

(1) Germplasm Collection and distribution activity:

(a) New agronomic, horticultural; and industrial plant introductions received in 1981 totaled 1020 new accessions. About 2056 were planted for seed increase

plus about 1650 plots for insect and disease evaluations. More than 16,000 packets of seed and plants were distributed. About 350 individual seed requests were received.

(b) Some of the largest distributions include 29 requests for 3,850 packets of Cucumis, 44 requests for 4,855 Helianthus, 55 requests for 2,206 tomatoes, 29 requests for 1384 alfalfa, and 112 requests for 1664 corn.

(c) Incoming collections include: (1) over 300 Amaranthus, mostly from Rodale Press, (2) 130 Brassica collected by P. F. Knowles and increased in California, and (3) 54 Setaria from the People's Republic of China. In 1981, the primary maintenance responsibility for annual alfalfa was transferred from S-9 to NC-7. Therefore, large collections of annual alfalfas were received in 1982. These include 125 accessions from Turkey and 508 accessions transferred from S-9.

(2) Plant Explorations from North Central Region

Only one exploration initiated in the NCR took place in 1982:

(a) Collecting alfalfa and other plants in Bolivia, Peru and Ecuador, by M. D. Rumbaugh and W. F. Lehman, in April and May. This exploration was deferred from 1980 to 1981. Of 206 accessions of various species, 85 were alfalfa, including local varieties. Nodules were collected, whenever possible of alfalfa as well as other legume species that were collected and sent to the Cell Culture and Nitrogen Fixation Laboratory at Beltsville, MD for preservation.

(3) Cooperative Agreement seed increases

(a) Increasing original seed of alfalfa of alfalfa introductions under cages - Reno, Nevada

(See attachment I for full report.) In 1981, 200 perennial alfalfa plant introductions were increased under isolation cages. Seed production varied from 0 to 600 g in the best producers. 2 year test was conducted to compare amber-colored leucite and gray-colored fiberglass screens for cages for seed production. Production on accessions 345654 and 251836, both purple flowered sativas, was 33 gms and 187 gms per cage for the leucite and 17 gms and 67 gms average per cage for the fiberglass, respectively. The fiberglass will be phased out gradually and replaced with leucite. Improved management practices to avoid damping off of seedlings and to provide better management of leaf cutter bees will be investigated in 1982 to increase production of low yielding accessions.

(b) Increasing seed of native grass collections - Brookings, South Dakota

(See attachment II for full report). Seed was harvested from individual plants of the following species:

Switchgrass	600 plants	(1980)
Big bluestem	600 plants	(1980)
Big bluestem	2,500 plants	(1981)

Seed will be sent to the National Seed Storage Laboratory for preservation. Computer printouts containing information on agronomic characters of individual plants are being developed.

(4) Regional Cooperative Program

(a) The Nebraska Station continued its intensified evaluation program on alfalfa introductions, which includes yield trials, replicated tests for insect resistance in addition to the single row field evaluation trials.

(b) Other stations in the region, as well as in other regions and foreign institutions, continue to evaluate plant introductions, as needed, in search of desired plant traits for inclusion in their breeding programs.

(5) Capital Improvements

We have completed moving into the new Office, Laboratory and Seed Processing building and are enjoying and making good use of the new facilities. The following

accomplishments were made toward furnishing the rooms and fine-tuning the building to suit our needs:

- (a) Used furniture was obtained from Iowa State University and re-painted.
- (b) An intercom telephone system was installed.
- (c) Accoustical panels to reduce echo and reflection of sound in the seed threshing and cleaning rooms was installed, resulting in a significant reduction of noise.
- (d) We converted from use of oil and LP gas to Natural gas for heating all buildings, including the greenhouse.
- (e) Installed a new furnace in the seed storage building to replace the 50 year old boiler previously used.
- (f) Protected the wall in the tractor wash area of the shop building with plastic.
- (g) Finished construction of a new entrance road to the PI farm that leads directly to the new building.
- (h) Made plans for removing the old quonset building in 1982.

(6) Progress on the GRIP Information System

(a) NPGS Registry Advisory Committee

This ten-member committee was established to advise NPGS (National Plant Germplasm System) and GRIP on the procedures and data associated with obtaining and introducing new accessions into the NPGS.

Membership is as follows:

Dr. Richard L. Bernard (Soybean Curator)
USDA/S&E/ARS
University of Illinois

Dorris Clark
USDA/S&E/ARS
National Seed Storage Lab
Fort Collins, Colorado

Dr. S. M. Dietz (Coordinator, Project W-6)
USDA/S&E/ARS
Western Regional Plant Introduction Station
Pullman, Washington

Dr. Otto Jahn
USDA/S&E/ARS
Northwest Plant Germplasm Repository
Corvallis, Oregon

Dr. William R. Kehr (Alfalfa Breeder)
USDA/S&E/ARS
University of Nebraska
Lincoln, Nebraska

Dr. Gilbert R. Lovell (Coordinator, Project S-9)
USDA/S&E/ARS
Southern Regional Plant Introduction Station
Experiment, Georgia

Dr. G. A. Marx (Pea breeder & curator)
Department of Seed and Vegetable Sci.
Agricultural Experiment Station
Geneva, New York

Dr. Donald J. Schrickel (Oats breeder)
Quaker Oats Company
Chicago, Illinois

Dr. E. E. Terrell
USDA/S&E/ARS
Plant Taxonomy Lab
Plant Genetics & Germplasm Institute
Beltsville, Maryland

Dr. George A. White
USDA/S&E/ARS
Plant Introduction Office
Beltsville, Maryland

Dr. R. L. Clark (Chairman)
USDA/S&E/ARS
North Central Regional Plant Intro-
duction Station

Ames, Iowa

During the meeting, held in Peoria, Illinois, March 12-13, 1981, a registry-specific descriptor list was developed. In addition, discussion and decisions were made on the following issues:

- 1) a universal identifier,
- 2) geopolitical country name changes,
- 3) data translation and transcription procedures,
- 4) changes in the taxonomy table

These decisions were then passed on to NPGS and GRIP as recommendations of the Registry Committee. In order to come to a consensus on these, and other matters, the GRIP Coordinating Committee was formed and held its first meeting on May 7-8, 1981, in Beltsville.

(b) Progress at the NC-7 location

We currently have prototype versions of the following software components: 1) registry, 2) maintenance and control, and 3) information exchange. Not all crops are "up" on these prototypes, but all will be included in the final implementation of the information system.

(c) Equipment

Purchase orders have been made up for a new terminal to be installed here and a separate telephone line, modem hookup to go with it. We hope to have this equipment in operation this spring. We will maintain our original teletype terminal and the associated CRT unit so that two people can work on data entry or processing at the same time.

In the future we will also have a terminal hooked up in our office building at the research farm just off campus.

(d) Tomato Crop Advisory Committee

The fourth meeting of this committee was held in College Park, Maryland, February 17, 1981, in conjunction with the Tomato Breeders Round Table. The following recommendations were made: 1) contact the curator regarding all questions concerning PI accessions; 2) descriptors, for evaluation purposes, are grouped in the following priority: diseases highest, adaptability next, fruit quality attributes third, and physical characteristics fourth; 3) committee membership should be rotated on a 3-year cycle; 4) representatives from all foreign countries are welcome as observers; 5) gene symbols should be recorded in plant descriptor form, including a coding scheme rather than notation of the actual gene symbol.

(e) Maize Crop Advisory Committee (Maize CAC)

The Maize CAC met for the first time on March 5 and 6, 1981, in Chicago, IL in conjunction with the NCR-2 North Central Corn Breeders Conference meetings. The sessions focused on: (1) finalizing a minimum set of plant descriptors and definitions to be used in the germplasm information system, using the International Board for Plant Genetic Resources (IBPGR) descriptor list for passport and collection data with additional descriptors developed by the Maize CAC. Insect and disease descriptors were rated a top priority for future evaluations, (2) concerns about the restricted genetic base of corn and the status of worldwide Maize collections, (3) ensuring the maintenance of existing collections and initiating seed increase projects as its highest priorities, and (4) a coordinated drive to obtain funds for seed increase projects, especially for material in some Latin American banks. A plan of action was drafted to address this priority.

Details of committee action are contained in the First Meeting Report, Maize Crop Advisory Committee available from the NC-7 coordinator.

(f) Alfalfa Crop Advisory Committee (Alfalfa CAC)

The alfalfa CAC met for the third time on August 17, 1981, in Boise, Idaho, in conjunction with the NCR-83 Legume Seed Production Technical Committee. The sessions

focused on: (1) refinement of an alfalfa evaluation proposal, (2) report on 1980 and 1981 plant exploration to Chile, Peru, Bolivia and Ecuador, and domestic exploration in Central and Western U.S. and Canada, (3) identifying geographic locations where collection trips should be undertaken, (4) proceeding with plans for reestablishing a varietal seed repository at Beltsville to accommodate foreign seed requests, (5) discussions with officials in Canada regarding the status and importance of Dr. Lesius' alfalfa collection with a view toward safeguarding it if necessary, (6) recommendations for making evaluations of alfalfa germplasm, and (7) preparing a semi-technical status report jointly prepared by the committee highlighting areas where are still needed.

Additional details appear in the Third Meeting Report of the Alfalfa Crop Advisory Committee available from the NC-7 coordinator.

(g) GRIP Coordinating Committee

In 1981 Dr. T. B. Kinney, ARS Administrator authorized the formation of the GRIP Coordinating Committee designated to perform the following functions: (1) Review fully the proposed GRIP Design Recommendations Working Report for the Information System, (2) Serve as focal point for communication, problem analysis, conflict resolution, and monitor GRIP progress toward full implementation of the Information System, and (3) make and have implemented the decisions necessary for putting the Information System into operation. The NC-7 coordinator is a member of this committee.

The first meeting was held on May 7-8, 1981 at the National Agricultural Library at Beltsville, MD. Discussions centered on: (1) the background of the project, such as GRIP team organization, project goal, history, and current status and problems, (2) the working document, (3) technical and organizational recommendations, (4) GRIP work plan, and (5) presentation and discussion of policy issues.

The second meeting was held on December 7-8, 1981 and focused on: (1) Review of the implementation plan, like sequence of site installations and what a software release is, (2) installation of a release, such as site preparation (data, people, etc.), on-site training, and follow-up arrangements, and (3) progress report on site preparation, data preparation, software production, and equipment acquisition.

Detailed information on both meetings is contained in the minutes and can be obtained from the NC-7 coordinator.

(7) Activities of Coordinator and staff

In 1981, the coordinator and staff performed various functions and travelled to meetings as follows:

(a) Wilson -- January -- attended meeting of the Sunflower Forum at Fargo, N.D.

(b) Clark -- February -- attended meeting of the Tomato Breeders Roundtable, Tomato Quality Workshop, and chaired the meeting of the Tomato Crop Advisory Committee at College Park, MD.

(c) Skrdla -- February -- presented a 10 minute radio interview with Roger Brown on WOI - radio farm program at 12:45 Feb. 6.

(d) Skrdla -- February -- presented a 5 minute TV interview about Plant Introduction with Roger Brown on WOI-TV "Town and Country" program at 7:25 AM Feb. 12.

(e) Wilson -- February -- attended a meeting of the Southern Corn Improvement Conference, Memphis, TN.

(f) Bhella -- February -- attended the Shade Tree Shortcourse at Iowa State University.

(g) Skrdla -- March -- attended meetings of the NCR-2 Corn Breeding Research Committee and the first Maize Crop Advisory Committee in Chicago.

- (h) Clark -- March -- attended meeting of NCR-2 and the corn pathology meeting in Chicago.
- (i) Clark -- March -- attended meeting, as Chairman, of the National Plant Germplasm System Registry Advisory Committee, Peoria, IL.
- (j) Skrdla -- March -- attended the National workshop on plant germplasm in Peoria, IL
- (k) Skrdla -- March -- Presented 4 lectures to the ISU Agronomy 523X class on Plant Germplasm.
- (l) Clark -- March -- presented 3 lectures to the ISU Agronomy 523X class on Plant Germplasm.
- (m) Plant Introduction Staff -- hosted the North Central Directors at the new Office, Laboratory, and Seed Processing building at the PI farm -- March 24.
- (n) Skrdla -- May -- Served on Program Review Team to review the New Crops program at the Northern Regional Research Center.
- (o) Skrdla -- May -- attended the first meeting of the GRIP Consultative Committee, Beltsville, MD.
- (p) Bhella -- May -- visited NC-7 ornamental trial sites in Kansas.
- (q) Skrdla -- June -- attended meeting of the NC-7 Technical Committee at East Lansing, MI.
- (r) Bhella -- July-August -- on temporary duty at the USDA-ARS Fruit and Vegetable Insects Research Station, Vincennes, IN.
- (s) Skrdla -- July-August -- Provided training in U. S. Plant Introduction and corn seed increase methods for Mr. Stoyko Georgiev, Senior Corn Specialist at the Institute of Plant Introduction and Genetic Resources, Sadovo, Plovdiv District, Bulgaria.
- (t) Skrdla -- July -- attended meeting of the NC-7 Ornamental Subcommittee, St. Paul, MN.
- (u) Skrdla -- August -- attended meeting, as chairman, of the Alfalfa Crop Advisory Committee and also the meeting of the NC-83 Legume Seed Increase Technical Committee in Boise, Idaho.
- (v) Skrdla -- August -- visited the cooperative agreement alfalfa cage seed increase plots at the University of Nevada, Reno.
- (w) Wilson -- September -- attended Corn Rootworm Rearing Workshop, Brookings, S.D.
- (x) Skrdla -- October -- attended meeting of the ARS Plant Germplasm Coordinating Committee, Denver, CO
- (y) Clark -- December -- attended second meeting (for Skrdla) of the GRIP Consultative Committee, Beltsville, MD.

(8) Personnel changes

- (1) Dr. II. S. Bhella transferred to the USDA-ARS Fruit and Vegetable Insect Research Station, Vincennes, Indiana on December 30, 1981. We are now recruiting for a replacement.
- (2) For the first time, in 1981, we have instituted, on a trial basis, a program of advanced study in the ISU graduate school by one of our farm staff Research Associates. Virginia Collison entered graduate school in August 1981, so was placed on a half-time appointment to give her time for graduate study. We hired another graduate student, Bryce Abel, to fill the other half of her position. Virginia will major in plant breeding with a research project on developing a cage technique for controlled interpollination of wild species and ecotypes of sunflowers. This is directly applicable to our project objective because we are responsible for such collections but no practical central pollination technique is known. Dr. K. J. Frey, ISU, is her major Professor and Dr. R. L. Wilson of our PI staff is on her graduate Committee.

Bryce Abel will do research on studying the inheritance of disease resistance in tomato; Dr. Frey is his major Professor and Dr. R. L. Clark, of our PI staff is on his graduate committee.

(9) Seed sent to the National Seed Storage Laboratory (NSSL)

Reserve quantities of seed of about 511 accessions were sent to the NSSL in 1981. This includes 63 Setaria, 88 corn, 27 cucumber, 219 tomato, and 29 ocimum (basil). In previous years we sent 5500 accessions so now the new total is 6011 accessions.

(10) Insect Resistance Screening

(a) 180 corn genotypes were evaluated in the greenhouse for black cutworm resistance. Eleven rated intermediate resistance and will be retested. Of 20 retested from 1980 screening, only PI 183799 rated intermediate resistance.

(b) Our tomato pinworm colony is improving. We are finally getting some insects for use in screening tests. Our lygus bug colony has been discontinued.

(c) 56 corn genotypes were evaluated for corn earworm silk feeding resistance. PI 427155 produced the smallest larvae when 6-day weights were taken (0.52 mg), compared to PI 221840 which produced the largest larvae (10.6 mg).

(d) 161 proso millet genotypes were screened in the laboratory and in the greenhouse for fall armyworm resistance. PI 185037 had the smallest 12-day larval weight (10.8 mg) and attracted the fewest larvae (1.2/plant) in an antixenosis test.

(e) 28 selected amaranths were screened in the laboratory and in the greenhouse for resistance to feeding by fall armyworms. Only A-2242 had smaller larval weights than the check cultivar, in two tests performed.

(f) Five corn genotypes (from Cargill) were screened in replicated tests for resistance to 1st instar black cutworms. No resistance was found.

(g) 144 corn genotypes were examined for corn leaf aphid infestation. 26 had no aphids, 52 had less than 10/plant 61 had more than 10/plant and 5 were heavily infested (hundreds/plant).

(h) three resistant and one susceptible corn inbreds are being tested in the greenhouse to determine whether day length has an effect on DIMBOA formation. Test is in progress.

(i) 28 selected amaranths were screened in the field for resistance to lygus bug feeding. Data is presently being collected and analyzed.

(11) Ornamental Program

(a) In cooperation with the NC-7 Ornamental Subcommittee, 1070 ornamental plants of 18 taxa were sent on request to 31 Regional ornamental trial cooperators and 19 Arboretum, Botanic Garden, and Park cooperators. These introductions included: Acer platanoides 'Royal Red', A. rubrum 'Armstrong', Aesculus glabra, Agapanthus sp. (PI 387881), Alnus cordata, A. glutinosa, A. incana, Buxus microphylla Koreana, Chrysanthemum 'Tomari' (PI 236036), Dianthus plumarius 'Snokey' (PI 371894) Elaeagnus umbellata 'Michigan 777', Euonymus Fortunei vegetus 'Chappel', Juniperus horizontalis 'Wisconsin', Malus Sargentii 'Roselow', Populus x canadensis eugenei 'Imperial', Rhododendron molle, Rosa 'Prairie Breeze', and Zebrina sp. (PI 406796).

(b) Ornamentals propagated and raised for 1982 distribution: Acer Ginnala, Elaeagnus angustifolia, Forsythia ovata, Juniperus squamata 'Blue Star' Populus x canescens 'Tower', Rhododendron 'Northern Lights', and Rosa rugosa (PI 384453). Incoming accessions included 31 ornamental PI's from the Arboretum of the Chinese Academy of Forestry, Beijing, People's Republic of China.

(c) Ten-Year Ornamental Testing and Evaluation Reports for Abeliophyllum distichum, Betula nigra, Celastrus Rosthornianus, Crataegus succulenta, Fraxinus americana 'Autumn Purple', Fraxinus pennsylvanica 'Marshall's Seedless', Hippophae rhamnoides, Juniperus horizontalis 'Admirabilis' and 'Pulchellus', Lonicera 'Bouquet'. L. Xylosteum nana 'Emerald Mound', Malus 'Dainty', 'Kebele', 'Mary Potter', 'Pygmy' 'Spring Snow', and 'White Angel', Philadelphus 'Ophelia', Potentilla fruticosa

'Arbuscula', Prunus triloba 'Multiplex', Salix sachalinensis 'Sekka', Sorbus scopulina, and Syringa reticulata were prepared. These reports indicate that Betula nigra, Forsythia europaea x ovata, Fraxinus americana 'Autumn Purple', F. pennsylvanica 'Marshall's Seedless', Hippophae rhamnoides, Juniperus horizontalis 'Admirabilis' and 'Pulchellus', Lonicera 'Bouquet', L. caerulea (PI 377880), L. Xylosteum nana "Emerald Mound", L. insularis (PI 316409), L. tatarica, Prunus triloba 'Multiplex', Rosa rugosa (PI 383453), and Sorbus scopulina performed exceptionally well and are recommended for the North Central Region.

(12) Plant Pathology Program

(1) Disease screening:

(a) Tomato fruit rot (Rhizoctonia solani)

The last of the PI tomatoes that were available for distribution some 545 lines, were included in the 1981 tests. Eighteen lines showed some resistance, the following seven after a second year of testing: 323510, 406756, 406776, 406804, 406865, 406991, and 407000. The latter six lines are all from Central America and are lines collected by Winters and Clark in 1976.

(b) Cucumber belly rot (Rhizoctonia solani)

Of 66 cucumber lines inoculated in sand benches this year, three showed resistance (163213, 165499, and 165509). PI 165509 had very high resistance, if not immunity, and is being grown in the greenhouse this winter to serve as the resistant parent in crosses to determine the inheritance of its resistance.

(c) Diplodia stalk rot of corn.

This year brought us to the end of the corn collection in our Diplodia screening with 144 lines in a replicated test. The most resistant lines in this year's test were: 221836, 221844, 420051, 427186, and 452045.

(d) Rust on corn

The 144 lines in the Diplodia test were also evaluated for rust reaction (P. sorghi). The best lines were: 406115, 406125, 406126, and 406127, all showing no rust on any plants in two reps (total of 20 plants). These four lines were also free of smut.

(e) Septoria leafspot of tomatoes

Greenhouse tests in March and April were run on 104 tomato accessions to evaluate their resistance and the effectiveness of various inoculation procedures. All five of the five L. peruvianum accessions tested (126434, 126440, 126944, 365951 and 379018) were resistant as were the 10 L. hirsutum lines: 365904, 365905, 365906, 390514, 390516, 390517, 390658, 390659, 390660, and 390661. Four L. parviflorum were tested and they were all resistant: 379031, 390677, 390678, and 390679.

None of the L. esculentum lines (approximately 70 lines) had resistance and only one of 16 L. pimpinellifolium accessions (422397) was resistant.

This winter, the rest of the 4500 lines in the tomato collection are being screened in the greenhouse.

(2) Disease control

Cucurbita and Cucumis seedlings were again examined, in the greenhouse, for presence of seed-borne viruses, diseased plants being destroyed. This procedure is followed for all original seed plantings of our vine crops before they are transplanted to the field.

4. USEFULNESS OF FINDINGS:

a. Plant Introductions continue to provide valuable germplasm for plant traits, disease and insect resistance, and other traits that are useful to plant breeders for developing, and improving crop varieties, which benefits the general public by increased food production, improved food quality, energy conservation, and a cleaner environment. The evaluation of plant introductions and the exchange for dissemination of information and seed through the NC-7 project, helps to better serve crops workers. The permanent

maintenance and preservation of plant introductions assures a valuable germplasm pool for present and future use.

5. WORK PLANNED FOR NEXT YEAR:

a. Continue (i) program of seed increase, storage, preliminary evaluation; (ii) pathology and entomology screening and evaluation work; (iii) check new plant introductions for abnormalities; (iv) local and regional testing of new crops and ornamentals, and (v) coordination of regional cooperative programs.

b. Implement computer assisted programs in cooperation with the Germplasm Resources Information Project.

c. Attend and participate in Annual Meetings of professional organizations, Regional Technical Committees, workshops, and crop commodity committees.

d. Visit stations in the region, and outside the region to conduct and coordinate plant germplasm work.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

Publications that concern information from the North Central Region on plant introductions are listed below. Publications from other regions on NC-7 primary maintenance crops are listed in Appendix A.

Regional Station Publications. [Author(s) is a member of the Regional Station Staff]:

(1) Ellis, M. D., G. S. Jackson, W. H. Skrdla, and H. C. Spencer. 1981. Use of honey bees for controlled interpollination of plant germplasm collections. Hort-Science 16(4):488-491.

(2) Wilson, F. D., R. L. Wilson, and B. W. George. 1981. Agronomic and fiber properties of primitive race stocks and hybrids of cotton. USDA-SEA Agric. Rev. Manual W-21.

(3) Wilson, F. D., B. W. George, and R. L. Wilson. 1981. Screening cotton for resistance to pink bollworm. USDA-SEA Agric. Rev. Manual W-22.

(4) Wilson, F. D., B. W. George, and R. L. Wilson. 1981. Lint yield and resistance to pink bollworm in early-maturing cotton. Crop Sci. 21:213-216.

(5) Wilson, R. L., and K. J. Starks. 1981. Effects of culture-host preconditioning on greenbug response to different plant species. Southwestern Entomol. 6:229-232.

(6) JarvFs, J. L., R. L. Clark, and W. D. Guthrie. 1982. Effect of infestation by 2nd generation European corn borers on stalk rot resistance in maize. Phytopathology 72: (accepted for publication 1-4-82).

(7) Bhella, H. S. 1981. Testing and evaluation of flowering crabapple 'Jackii', 'Pink Spires', 'Royalty', and 'Sparkelr'. Plant Prop. 27 (Accepted on August 18, 1981.)

(8) Bhella, H. S. and White, G. A. 1981. Ornamental plant introductions 1977. Plant Prop. 27(1):3-5.

(9) Bhella, H. S., and G. A. White. 1981. Ornamental plant introductions 1978. Plant Prop. (In manuscript).

(10) Bhella, H. S. 1981. Ten-year testing and evaluation reports for the North Central Regional Ornamental Plantings: 1967-77. USDA-ARS Technical Research Report.

(11) Bhella, H. S. 1981. Ten-year testing and evaluation reports for the North Central Regional Ornamental Plantings: 1968-78. USDA-ARS Technical Research Report.

(12) Bhella, H. S. 1981. Ten-year testing and evaluation reports for the North Central Regional Ornamental Plantings: 1969-79. USDA-ARS Technical Research Report.

(13) Bhella, H. S. 1981. Ten-year testing and evaluation reports for the North Central Regional Ornamental Plantings: 1970-80. USDA-ARS Technical Research Report.

(14) Bhella, H. S. 1981. Ten-year testing and evaluation reports for the North Central Regional Ornamental Plantings: 1971-81. USDA-ARS Technical Research Report.

b. State Station Publications

None

c. Journal Articles

(1) Iowa

(a) Jarvis, James L. 1980. Resistance in sunflowers to sunflower moth. IA State J. of Research 54(3)391-400.

(b) Jarvis, J. L., and W. D. Guthrie. 1980. Resistance of maize plant introductions to sheath-collar feeding by 2nd-generation European corn borers. Maydica XXV (1980):25-32.

(2) Kansas

(a) Johnson, K. J. R., E. L. Sorensen, and E. K. Horber. 1980. Resistance in glandular-haired annual Medicago species to feeding by adult alfalfa weevils (Hypera postica). Environ. Entomol. 9:133-136(1980).

(3) Michigan

(a) Honma, S., H. C. Price, H. H. Murakishi, and C. L. Bedford. 1980. Mini-Spartan tomato. Michigan Agric. Expt. Sta. Res. Rpt. 399.

(b) Rick, C. M. 1980. Mini-Spartan tomato. Tomato Genetics Cooperative Report. 31:43.

(4) Nebraska

(a) Kehr, W. R., G. R. Manglitz, and R. L. Ogden. 1981. Registration of Perry Alfalfa. Crop Sci. 21(2):349.

(5) Wisconsin

(a) Irwin, J. A. G., D. P. Maxwell, and E. T. Bingham. 1981. Inheritance of Resistance to Phytophthora megasperma in Diploid Alfalfa. Crop Sci. 21(2):271-276.

(b) Mutschler, Martha A., and F. A. Bliss. 1981. Inheritance of Bean Seed Globulin Content and its Relationship to Protein Content and Quality. Crop Sci. 21(2):289-294.

(c) Williams, P. H. and R. Prowidenti. 1980. Brassica and Raphanus germplasm Resources in Canada and the United States. Manuscript (Report to the Brassica working group of the International Board of Plant Genetics Resources, Tokyo, Japan..

7. APPROVED:

2/16/82

Date

T. Hymowitz

Chairman, NC-7 Technical Committee
T. Hymowitz

3/1/82

Date

R. W. Hougas

NC-7 Administrative Adviser
R. W. Hougas

1. Publications

The publications listed below are from other regions, or foreign sources, but concern NC-7 primary crops.

a. Alfalfa

(1) Rumbaugh, M. D., and D. A. Johnson. 1981. Screening alfalfa germplasm for seedling drought resistance. *Crop Sci.* 21(5):709-713.

b. Cucumber

(1) Van Der Meer, Q. P., J. L. Van Bennekom, and A. C. Van Der Giessen. 1978. Gummy Stem Blight Resistance of Cucumbers (Cucumis sativus L.). *Euphytica* 27:861-864.

c. Impatiens

(1) Pasutti, D. W., and J. L. Weigle. 1980. Pollen fertility in Java x New Guinea Impatiens interspecific hybrids. *Canadian Journal of Botany* 58(3):384-387.

d. Tomatoes

(1) Jones, R. A., P. G. Wmth, A. H. Millett, and K. A. Kimble. 1980. 'Royal Red Cherry' and 'Short Red Cherry' tomatoes. *HortScience* 15(1):98.

(2) Kerr, E. A., and G. E. Reaume. 1981, Ontario Pink 774 and Ontario Red 775. Greenhouse Tomatoes. *Can J. Plant Sci.* 61:779-780 (July 1981).

(3) Kerr, E. A. (Ontario Ministry of Agriculture and Food). 1980. Correspondence with C. M. Rick 12/9/80 Re: 'Ontario Pink 774' and 'Ontario Red 775'. *Tomato Genetics Cooperative Report* 31:43.

(4) Rick, C. M. 1980. 'Royal Red Cherry' and Short Red Cherry' Tomatoes. *Tomatoes Genetics Cooperative Report* 31:43.

Alfalfa Seed Increase of Plant Introductions

Reno, Nevada 1981

B. D. Thyer

Two hundred perennial *Medicago* plant introduction accessions were increased in 1981 under isolation cages. Seed production was highly variable as a result of several factors including poor flower production, poor nectar production, and limited bee visitation. Seed production ranged from zero in a few lines to 600 g in the best producers.

In an effort to obtain good establishment of plants, ninety accessions were established in the greenhouse for transplanting in 1982. Forty will be transplanted in spring for 1982 production and fifty will be transplanted in August 1982 for production in 1983. Approximately 180 accessions already established in the field during 1981 will make a total of 220 lines available for production in 1982.

Many of the accessions are poor seed producers for one reason or another. Several steps have been taken this year in an effort to improve production on those lines. As a follow-up to 1980 work, a replicated trial was conducted using amber-colored lumite and gray-colored fiberglass screens for cages on several accessions. Production on accessions 345654 and 251836, both purple flowered sativas, was 33 grams and 187 grams average per cage for the lumite and 17 grams and 67 grams average per cage for the fiberglass, respectively. Thus, the lumite resulted in approximately twice the seed production as did the fiberglass. The fiberglass will gradually be phased out of the program in favor of the lumite.

Foliar applications of nitrogen resulted in higher seed production in some lines. This will be investigated more thoroughly in 1982.

Many accessions are difficult to establish due to susceptibility to damping-off. The Ciba-Geigy experimental fungicide "Ridomil" (CGA-48988) was used as a drench on newly seeded lines and increased survival from 5 to 40% to more than 90%. Other studies underway in the alfalfa production, research unit (ARS) are investigating the use of this chemical as both a seed treatment and a soil drench to aid in establishment of field plantings;

The use of leafcutter bees in place of honeybees as pollinators aided seed production in many lines, particularly yellow flowered *Medicago falcata* types, and other species with inherently poor seed production. It is anticipated that improved leafcutter bee management in 1982 will further enhance overall seed production.

CONTROLLED POLLINATION II - SEED INCREASE OF
BIG BLUESTEM, SWITCHGRASS AND INDIANGRASS
BROOKINGS, SOUTH DAKOTA, 1981
ARVID BOE

In 1980, seed was harvested from approximately 600 individual switchgrass plants in a 1972 spaced-plant nursery at Brookings. Parents of these plants are relict populations from northeastern and southeastern South Dakota. The seed has been threshed and cleaned and is currently stored at 6" C and 45% RH in the cold storage facility at SDSU.

Also in 1980, seed was obtained from approximately 600 individual big bluestem plants in a 1965 spaced-plant nursery at Brookings. Parents of these plants are relict populations from southeastern South Dakota. This seed is also being stored in the SDSU cold storage facility.

In 1981, seed was harvested from approximately 2500 individual big bluestem plants in a 1972 spaced-plant nursery at Brookings. Parents of these plants are relict populations from eastern South Dakota. At present, 1200 of these plants have been threshed.

Computer printouts containing information on agronomic characters of individual plants within each of the nurseries are presently being developed. They will contain Collection area descriptions for each ecotype, and basic statistics (i. e. agronomic characters means and variances) for ecotypes and families within ecotypes. These printouts will be much more efficient and readable than the field books in which the data have been kept.