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, 1987

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

II. COOPERATING AGENCIES AND PRINCIPALS LEADERS:

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B. Regional Coordinator — R. L. Clark, Iowa

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5. Kansas	*C. E. Wassom	12. S. Dakota	*A. Boe
6. Michigan	*A. Iezzoni, Chm.	13. Wisconsin	*W. Gabelman
7. Minnesota	*H. Pellett		

* Voting members

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3. ARS Area Director, Midwest Area	G. E. Carlson
4. Cooperative State Research Service	S. Wiggans
5. Soil Conservation Service	*E. T. Jacobson
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E. North Central Regional Plant Introduction Station, Ames, Iowa

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a. Research Leader and Supervisory Plant Pathologist	R.L. Clark
Secretary	L. Sunstrum
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Agricultural Research Technician	B.J. Morrell
c. Horticulturist	M. Widrlechner
d. Research Entomologist	R.L. Wilson
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2. Iowa State University Staff

a.	Farm Superintendent	L.L. Lockhart
	i. Field-Lab Technician III	D. Lutjen
	ii. Field-Lasb Technician II	G. Brownrigg
	iii. Secretary II	R. Diedrichs
	iv. Clerk Typist II	L. Minor
b.	Curator/Coordinator (GRIN system) and Corn Collection	M.J. Millard
	i. Clerk IV	C. Latta
c.	Research Associate II (Plant Pathology)	C.C. Block
d.	Research Associate I (Grasses, Brassica)	B.C. Abel
e.	Research Associate I (vegetables)	K. Reitsma
f.	Research Associate I (Sunflowers, miscell.legumes)	J. Pomeroy
g.	Predoctoral Research Assoc. (Amaranthus)	J. Lehmann

III. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

A. Introduction of new germplasm

New accessions entering the NC-7 Program in 1987 totaled 4,548.

B. Germplasm Multiplication

Seed increases were attempted on over 1500 accessions at Ames including: 119 Amaranthus in the field, 470 Brassicas, 201 Helianthus, 126 cucumbers, 127 corns, 107 Cuphea, 95 annual Medicago spp., 64 carrots, 53 pumpkins, 48 cantaloupes, 44 parsley, 33 Setarias, 19 parsnips, and 15 chicories. In addition, 400 annual Medicagos and 160 perennial alfalfas were increased under contract at Riverside, CA and Prosser, WA, respectively. Another 100 beets were increased in isolation field tents in Logan, UT. Leafcutter bees in cages accomplished the pollinations on the perennial Medicago spp. grown in Prosser. The annual Medics are self-pollinators so were grown without cages.

Pollination control in corn, sunflowers, and pumpkins was accomplished by hand-pollination, sibbing heterzygous lines, selfing inbreds. At least 200 plants are grown (corn and sunflowers) and attempts are made to involve all plants in the sibbing process with at least 100 seed-bearers represented in the harvest. Pumpkins are planted in 24 plant plots, 3 plants in each of 8 hills. We try to obtain at least three sibbed fruits per hill.

Wild sunflowers, cucumbers, cantaloupes, Brassicas, carrots, parsely, parsnip, chicory, and Cuphea were increased in cages. Pollinators were usually honey bees but flies were also used for the members of the carrot family. Leafcutters were the pollinators for Cuphea. We hired a full-time Technician in 1987 to manage all our insect pollinators.

The trial planting of 400 annual Medics in Riverside, CA was a success and that program will be continued in 1988. Likewise, the first year's increase of perennial Medicago spp. at Prosser, WA was very successful and will be continued. Both of these programs will be managed by the Pullman, WA, Plant Introduction Station in 1988 because we transferred maintenance responsibility for all Medicago species to that site in late 1987.

C. Germplasm Distribution

There were 295 domestic seed requests and 97 from foreign scientists. Packets distributed in response to these requests were: 12,972 and 6,216 domestic and foreign, respectively. We distributed 7,225 packets into the North Central Region, 2,651 into the Western, 2,470 into the Southern, and 563 into the North East Region. This year's total (19,188 packets) distribution is more than 3,000 higher than a year ago, indicating an increased interest in our germplasm.

By crops, this year's distribution was highest for cucumber (4,806) followed by the oilseed Brassicas (4,162), corn (2,486), sunflowers (2137), tomato (2001), alfalfa (1277), beets (642), carrots (604), and Amaranthus (372).

D. Germplasm Evaluation

1. Woody Ornamental Regional Trials.

a. Regional cooperators were sent 704 ornamental plants of 13 accessions for trial at 28 sites. An additional 128 plants of these accessions were sent to arboreta.

b. Computer-generated "Report of Planting," "Plot Information," and "First-year Performance Report" forms were distributed to trial sites this spring and the returned, completed forms are being compiled.

2. Cooperator Evaluations

a. Vegetables

Two early blight resistant tomato lines were released by North Carolina that derived their resistance from PI 126445, Lycopersicon hirsutum. The Florida variety Florida Petite had PI 205046 as one parent. The Michigan breeding population, MI-2000, released in 1987, derived its bacterial canker resistance from PI 330727 (Bulgaria 12).

Other useful traits reported in 1987 were: Fusarium resistance in Asparagus (PI 207461), Aphanomyces root rot in peas, and tolerance to the herbicide Trifluralin in Cucurbita pepo (PI 234252) and C. maxima (PI 182202).

b. Oil Seed and Special Crops

Two open-pollinated sunflower cultivars from Russia, Novinka (PI 430538) and Progress (PI 430541) were used as resistant parents in a study of the inheritance of race 3 downy mildew resistance. Various accessions of Amaranthus, Helianthus and Cuphea are being used as source materials for biotechnical studies on mechanisms responsible for production of specific chemicals.

c. Legumes

Two diploid alfalfa accessions (PI 325408 and 410970) were used as resistant parents in a study of the inheritance of Phytophthora root rot resistance. Three accessions of tetraploid alfalfa (PI 345641, 404217, and 410975), were used in the development of experimental variety NAPB32, and the latter two accessions were also involved in experimental NAPB31. Six other alfalfas are being used in a program to select a grazing-tolerant alfalfa in Georgia. Of 1200 tested for Phytophthora root rot in Wisconsin, 13 showed good resistance and will be studied further.

Two accessions of milkvetch, Astragalus cicer (PI 133142 and 362245), showed excellent vigor and winterhardiness at the Elsberry, MO Plant Materials Center. Two accessions of castor bean were used in physiologic studies as a source of glyoxysomes in a Minnesota study.

d. Grasses and Corn

Grass genera used and showing promise for various traits include: Beckmannia (forage production and quality), Eragrostis (forage production), Sorghum (greenbug resistance) and Lolium (anther culture and haploid plant regeneration. Lolium was also being used in photoperiod induction work in a grown chamber study in Missouri.

Corn accessions were reported to have: good combining ability, enhanced emergence from deep planting, drought and heat tolerance, improved protein, increased lysine, improved standability, flooding tolerance, and first generation European corn borer resistance.

3. Evaluations at the PI Station

a. Agronomic and horticultural traits

Over 500 accessions of oilseed Brassica spp. were evaluated for flowering date, seed pod arrangement, pod beak length, total pod length, pod width, locule number, pod surface, plant height, harvest date, 100-seed weight, seed color, and germination percentage of newly harvested seed. Winterhardiness data were obtained on 217 accessions of Brassica planted in six locations in North America. Data were also taken on 33 accessions of Setaria italica for heading date, leaf number and width, stem number and texture, panicle width and length, plant height and harvest date.

b. Pest evaluations

Northern corn leaf blight (race 1), common rust, and common smut evaluations were made on 400 accessions in the field. Results are being analyzed. Alternaria leaf blight evaluation techniques are under development for greenhouse screening of the sunflower collection. The cucumber collection (721 accessions) was evaluated for powdery mildew reaction in greenhouse tests. Highest resistance occurred in PI 197088, 288238, 321006, and 390258.

Silk feeding resistance to corn earworm in 107 corn accessions was evaluated in lab tests, along with 40 popcorns in field tests.

Screening for resistance to sunflower moth was carried out on 223 sunflower PI lines as part of the Sunflower CAC-approved evaluation plan.

IV. Plans for next year

We will continue to carry on an active germplasm acquisition program aimed at eliminating gaps in our collections. The most active program in 1987 was acquisition of tropical corn lines from Mexico, Colombia, and Peru. This will continue and is expected to lead to an additional 1500 lines in 1988.

We will continue to work closely with the CAC's for maize, sunflower, forage grasses, sugarbeet, cruciferous crops, leafy vegetables, root and bulb crops, and vine crops to coordinate our efforts with other parts of the National Plant Germplasm System.

We plan to acquire several hundred accessions from the collection of industrial crops housed at the USDA's Northern Regional Research Center in Peoria and enter them into our regeneration, evaluation, storage, and distribution program.

V. Publications

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ATTACHMENT 1

V. B. From cooperators

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