

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, 1985

I. PROJECT! NORTH CENTRAL REGIONAL PROJECT NC-7

Introduction, **Multiplication, Evaluation,**
Preservation, Cataloguing, Enhancement, and
Utilization of Plant Germplasm

II. COOPERATING AGENCIES AND PRINCIPAL LEADERS:

A. **Administrative Adviser** R. L. Mitchell, Missouri

B. Regional Coordinator R. L. Clark, Iowa

C. State Experiment **Stations and Representatives**

- | | | | |
|--------------|-------------------|---------------|-----------------|
| 1. Alaska | *R. L. Taylor | 8. Missouri | *P. Beuselinck |
| 2. Illinois | *T. Hymowitz | 9. Nebraska | *D. J. Andrews |
| 3. Indiana | *J. Janick, Chm. | 10. N. Dakota | *J. Franckowiak |
| 4. Iowa | *I. T. Carlson | 11. Ohio | *S. Z. Berry |
| 5. Kansas | *C. E. Wassom | 12. S. Dakota | *R. Peterson |
| 6. Michigan | *Amy Iezzoni Secy | 13. Wisconsin | *W. Gabelman |
| 7. Minnesota | *H. Pellett | | |

D. **U. S. Department of Agriculture**

- | | |
|--|-----------------|
| 1. ARS Germplasm Resources Laboratory | *G. A. White |
| 2. ARS Asst. to Deputy Administrator, Germplasm | H. Shands |
| 3. ARS Area Director, Central Plains Area | P. A. Putnam |
| 4. Cooperative State Research Service | S. Wiggins |
| 5. Soil Conservation Service | *E. T. Jacobson |
| 6. Northern Regional Research Center | *R. Kleiman |
| 7. National Seed Storage Laboratory | D. Clark |

E. **North Central Regional** Plant Introduction Station, Ames, Iowa

- | | |
|---|------------------|
| 1. USDA-ARS staff | |
| a. Research Leader and Research
Plant Pathologist | R.L. Clark |
| b. Research Agronomist | W.W. Roath |
| c. Horticulturist | M.P. Widrlechner |
| d. Research Entomologist | R.L. Wilson |
| e. Agricultural Research Technician
(Insects) | S.G. McClurg |
| f. Agricultural Research Technician | B. J. Morrell |

2. Iowa State University Staff

a. Farm Superintendent	L. L. Lockhart
b. Research Associate II, Plant Pathology	C. C. Block
c. Research Associate I, sunflowers, legumes	J. Pomeroy
d. Research Associate I, corn, industrial crops	M. J. Millard
e. Research Associate I, grasses, Brassica	B. C. Abel
f. Research Associate I, vegetables	K. R. Reitsma
g. Predoctoral Research Associate, amaranth	J. Lehmann
h. Field-Lab Technician III	D. L. Lutjen
j. Field-Lab Technician I.	G. L. Brownrigg
k. Secretary II	R. L. Diedrichs
l. Clerk IV	C. Lata
m. Clerk/Typist II	L. D. Minor

III. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

A. Introduction of new germplasm

New accessions entering the NC-7 Program in 1985 **totalled** 2145. Largest increases came in alfalfa (769 accessions), beets (**219**), tomatoes (**225**), and sunflowers (617). Total NC-7 inventory now includes 23,513 accessions.

B. Germplasm Multiplication

Seed increases were accomplished on: 366 alfalfa accessions; 125 Amaranths; 74 cucumbers; 45 pumpkins; 60 carrots; 197 tomatoes; 42 parsley; 400 corns; 179 sunflowers; 293 oil-seed Brassicas; and 42 grasses; as well as several hundred miscellaneous species. Pollination control was accomplished by use of hand-sibbing (or occasionally selfing) for corn, large-headed sunflowers, and pumpkins; by caging and use of honey bees for cucumbers, parsley, carrots, chicory, Zinnias, oil-seed Brassicas, and wild-type sunflowers; and bagging individual or adjacent heads of Amaranth.

C. Germplasm Distribution

Domestic seed requests from 240 individuals were satisfied by shipment of 10,961 accessions of germplasm, mostly (10,001) as seed samples. Numbers of samples distributed in 1985, for those crops with at least 100 samples sent, were as follows: 231 **Setaria** (foxtail millet), 2022 corn, 551 alfalfas (annual and perennial), 148 beets, 582 cucumbers, 192 carrots, 4,336 tomatoes, 118 parsely 498 oil-seed Brassicas, and 541 sunflowers.

Foreign seed requests from 99 researchers were satisfied by shipment of 2,508 packets of seeds. The more commonly requested crops for these foreign seed requests were: 128 corn, 79 alfalfa, 129 beets, 511 cucumbers, 884 tomatoes, 169 oil-seed Brassicas, and 225 sunflowers.

Distribution of seeds outside the North Central Region, but within the U. S., were as follows: 999 to the Northeastern Region, 1,328 to the Western, and 2,291 to the Southern.

An additional 425 accessions were sent to NSSL for back-up seed lots.

D. Germolasm Evaluation

The woody ornamentals regional trials were reestablished with 598 plants of 10 accessions sent to 26 trial sites. Another 126 plants were distributed to trial sites either as replacements for plants that had died or for requests that had been made in 1984. The Dianthus variety released in 1981 by the Nebraska AES and USDA-ARS and named '**Smokey**' came from PI 371894 originally from Siberia, which had been evaluated in this regional program.

Corn accessions showing promise in cooperator evaluations included 200201 for drought tolerance, 195737 and 393711 for earliness and standability, and 213765 and 213766 for tolerance to extreme heat and insects. Alfalfa accessions with potato leafhopper and alfalfa weevil resistance in Wisconsin were 170532 and 179370. Resistance to spider mites was found in three Brassica carinata accessions: 273637, 280230, and 390133. Herbicide resistant tomato germplasm lines released by the University of Georgia (UGA 1113MT and UGA 1160MT) traced back to single plants from PI 204976 and 205023 respectively. The Vegetable Laboratory, USDA-ARS, **Beltsville** Agricultural Research Center released a tomato germplasm line resistant to anthracnose, **85B126**. The anthracnose resistance is derived from PI 272636.

Lygus bug reproduction was significantly lower on Amaranthus hypochondriacus than on A. cruentus heads in field tests at Ames. No major leaf diseases occurred on 1800 Amaranthus accessions but some A. cruentus were affected by Rhizoctonia root rot. A. tricolor and A. blitum were affected by a severe Phomopsis stem blight that appeared in mid-August.

The ten most resistant cucumbers to belly rot, out of over 650 evaluated, were: 165509, 173889, 196844, 197085, 197086, 197087, 250147, 271328, 299570, and 390261.

IV. USEFULNESS OF FINDINGS

Plant Introductions continue to provide valuable germplasm to plant breeders and other plant scientists and represent sources of new plant traits, disease and insect resistance, and new genotypes for various genetic and physiologic research. Development of improved crop varieties incorporating some of these traits benefits the general public by increased food production, improved food quality, energy conservation, and a cleaner environment due to reduced need for pesticides. Through work at the regional station seed of world collections of economic crops, and potentially new crops, is maintained for future use. This will allow more diversification of agriculture in the US and an increased genetic base for established crops.

V. WORK PLANNED FOR NEXT YEAR:

The regional station will continue to receive, propagate, catalog and distribute germplasm for evaluation and utilization by plant scientists. Screening studies will continue to locate sources of disease and insect resistance. Some enhancement work will be carried out to increase the availability of specific genes from primitive germplasm, especially in the area of Septoria resistant tomatoes and belly rot resistant cucumbers.

The Amaranth collection will be studied further to determine proper pollination and seed production techniques and to identify accessions to the species level.

Close liaison will be continued with the Crop Advisory Committees for maize, alfalfa, **crucifers**, vine crops, sunflowers, tomatoes, sugar beets, root and bulb crops, and forage grasses. Various staff members from this station will be attending each CAC meeting.

Liaison with other units in the National Plant Germplasm System will be continued via correspondence, phone calls, and meetings of such committees as the NC-7 Technical Committee and the Plant Germplasm Operations Committee.

IV. PUBLICATIONS:

a. From the Regional Station Staff

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2. Widrlechner, M. P. 1985. NC-7 Ornamental Trials. North Central Nurserymen **7:12-13.**
3. Wilson, R. L. 1985. USDA-ARS, North Central Regional Plant Introduction Station, Iowa State University, Ames. *Ann. Plant Resist. Insects Newsletter* **11:17-18.**

4. Wilson, R. L., Clark, R. L., and Widrlechner, M. P. 1985. A brief history of the North Central Regional Plant Introduction Station and a list of genera maintained. **Proc. Ia. Acad. Sci. 92:63-66.**

B. FROM COOPERATORS:

1. Ammati, M., Thomason, I. J., and Roberts, P. A. 1985. Screening Lycopersicon spp. for new Genes Imparting Resistance to Root-Knot Nematodes (Meloidogyne spp.) Plant Dis. **69:112-115.**
2. CAST 1985. Plant Germplasm Preservation and Utilization in U. S. Agriculture. Report No. 106, November, 1985, **35p.**
3. Rick, C. M. 1985. Miscellaneous stocks - revised list. TGC Report **35:22-31.**
4. Rowe, D. E. 1986. Effects and Control of Genetic Drift in the Antotetraploid Population. Crop Science **26:89-92.**
5. Thomason, I. J. and Ammati, M. 1985. Potential Sources of Heat Stable Meloidosvne incognita Resistance in Lycopersicon spp. Phytopathology **75:1336.**
6. Volenec, J. J. 1985. Leaf Area Expansion and Shoot Elongation of Diverse Alfalfa Germplasms. Crop Science **25:822-827.**
7. Lindgren, D. T. and Uhlinger, R. D. 1981. 'Smokey' Dianthus. HortScience **16:789-790.**
8. Phatak, S. C. and Jaworski, C. A. 1985. UGA 1113MT and **UGA1160MT** Metribuzin-tolerant Tomato Germplasm. HortScience **20:1132.**
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V. APPROVALS

Date

Chairman, NC-7 Technical **Comm.**
Jules **Janick**

Date

NC-7 Administrative Adviser
R. L. Mitchell

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6. Michigan	*Amy Iezzoni Secy	13. Wisconsin	*w. Gabelman
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3. ARS Area Director, Central Plains Area	P. A. Putnar
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5. Soil Conservation Service	*E. T. Jacob
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f. Research Associate I, vegetables	K. R. Reitsma
g. Predoctoral Research Associate, amaranth	J. Lehmann
h. Field-Lab Technician III	D. L. Lutjen
i. Field-Lab Technician II (1/4 time)	J. Pomeroy
j. Field-Lab Technician I.	G. L. Brownrig
k. Secretary II	R. L. Diedrich
l. Clerk IV	S. VanDeVoorde
m. Clerk/Typist II	L. D. Minor

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NC-7 BUDGET REQUEST, FY 88

	FY 87 Approved 3/86	RRF Funds FY 7 Revised 9/86	FY 8 Requested 9/86	USDA-ARS Funds FY 87
I. Basic Budget				
A. <u>Personnel</u>				
1. Salary	203,400	203,400	212,000 ^{2/}	247,757
2. Hourly	22,728	79,000 ^{1/}	80,000 ^{1/}	
B. <u>Operations</u>				
1. Utilities	34,950	- 1/	- 1/	50,000
2. Printing	8,000	- 1/	- 1/	
3. Equip. Rental	13,000	5,000	5,000	
4. Travel	3,500	9,000	9,500	12,200
5. Farm Land Maint	1,000	- 1/	- 1/	
6. Computer Serv.	6,500	- 1/	- 1/	
7. Equip. & Supplies	18,685	15,363	37,000 ^{3/}	58,793
8. Broadform C/A				171,426
9. Specific C/A				255,668 ^{4/}
10. Equipment				50,317
11. Onas Mays Contract				7,000 ^{5/}
12. Transfer to Fargo,ND				16,500 ^{6/}
	<hr/>	<hr/>	<hr/>	<hr/>
	\$311,763	\$311,763	~\$343,500	\$869,661 ^{7/}
II. <u>Additional Needs</u>				
A. Equipment and Facilities				
1. Farm tractor, 42 hp			\$15,000	
2. Remodeling of headhouse			\$60,000	
B. Personnel				
1. Research Associate for Legumes			\$16,500	
2. Technician I, Farm,			\$12,800	

- 1/ Reflects shift from using USDA for all hourly payroll; will pay utilities and other expenses from USDA-ARS budget.
- 2/ Represents an expected 4% ISU salary increase.
- 3/ Represents a need for replacing 100 cages @ \$200/cage, plus other normal operating supplies (pollinating and harvesting bags, fertilizers, pesticides, sugar for feeding bees).
- 4/ Extramural money obligated to support germplasm maintenance in Illinois, California, Oregon, and Washington.
- 5/ Beet seed increase in Utah.
- 6/ Sunflower evaluations, diseases and insects.
- 7/ Ames operating budget = \$342,736 spread over six CRIS units, four scientists.

Iowa State University Contribution to NC-7

	<u>FY 86</u>	<u>FY 87</u>
Salaries	13,917	15,100
Benefits	48,250	48,900
Facilities off-campus	44,386	46,600
Facilities on-campus	62,025	65,125
Farm Residence	<u>67,000</u> ^{2/}	<u>3,600</u>
	\$235,578	\$179,325

2/ Includes construction of a new Residence.