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, 1974

1. PROJECT: NORTH CENTRAL REGIONAL PROJECT NC-7
NC-7 "new Plants" - The Introduction, Multiplication, Preservation and Evaluation of New Plants for Industrial and Agricultural Utilization.

2. COOPERATING AGENCIES AND PRINCIPAL LEADERS:

Administrative Adviser — R. W. Hougas, Wisconsin
Regional Coordinator — W. H. Skrdla, Iowa

State Experiment Stations and Representatives

Indiana	*K. J. Lessman, Chm.	Missouri	*A. D. Hibbard
Alaska	*R. L. Taylor	Nebraska	*J. H. Williams
Illinois	*T. Hymowitz	North Dakota	*J. S. Quick
Iowa	*I. T. Carlson	Ohio	*M. H. Niehaus, Sec'y
Kansas	*C. E. Wassom	South Dakota	*R. M. Peterson
Michigan	*R. L. Andersen	Wisconsin	*W. H. Gabelman
Minnesota	*C. Stushnoff		

U.S. Department of Agriculture

ARS Germplasm Resources Laboratory	*G. A. White
	H. L. Hyland
ARS National Program Staff	Q. Jones
Cooperative State Research Service	C. I. Harris
Soil Conservation Service	A. A. Thornburg
Northern Regional Research Laboratory	*W. H. Tallent
Agricultural Research Service	*J. L. Jarvis, Iowa

*Voting members of NC-7 Technical Committee

North Central Regional Plant Introduction Station Staff, Ames, Iowa

Regional Coordinator	W. H. Skrdla
Research Horticulturist	A. F. Dodge
Research Plant Pathologist	R. L. Clark
Research Entomologist	J. L. Jarvis

3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS:

a. Introductions Having Special Value

Described below are plant introductions, reported by cooperators in 1974, that are considered to have made important contributions to plant breeding programs and to U.S. agriculture. Additional reports on these and other plant introductions which describes their value in greater detail are provided in Appendix C of this report, titled "Promising Plant Introductions for 1974".

(1) Alfalfa

(a) PI 206452 from Turkey is being used in commercial hybrid production. It will contribute 25% of the genetic make-up of MX82B. The clone selected is high in forage yield, high in seed set and has bacterial wilt resistance.

(b) Out of 900 alfalfa introductions evaluated, 37 had low clover root curculio larvae feeding lesions on individual plants.

(c) Introductions of alfalfa are being used in germplasm pools. Thirty six were used in the pool, NC-83-1, adapted to the northern alfalfa growing areas of the United States. In another pool, NC-83-2, adapted to the southern alfalfa growing areas of the United States, forty five alfalfa plant introductions were used. All entries in both pools have some resistance to one or more important pests, which include diseases, insects, and stem nematode.

(2) Canarygrass (annual)

'Alden' canarygrass was released by the Minnesota AES. It is derived from PI 251390 from Iran.

(3) Corn

(a) PI 186208, Boesman yellow flint from South Africa, has tolerance to southern corn rust.

(b) PI 213787, Rainbow flint from North Dakota, carries cytoplasmic male sterility of the S (or USDA) Type.

(c) PI 214199, Rainbow flint from Canada, carries a male sterile trait, probably cytoplasmic, but not yet categorized.

(4) Cucumber

PI 227207, Cucumis sativus from Japan, contributed scab and CMV resistance to 'Quebec Vert',a cultivar released in Quebec, Canada.

(5) Millet

PI 170603, Panicum miliaceum from Turkey was released as the cultivar 'Cerise' by the Nebraska Station.

(6) Tomato

(a) PI 79532, Lycopersicon pimpinellifolium from Peru, was used in the pedigree of 'Pink Savor' and 126445, L. hirsutum from Peru in 'Caro Rich', which were released by the Missouri Station.

(b) The crack resistant trait from PI 250432, L. esculentum from Czechoslovakia was used in three cultivars released in Quebec, Canada. They are 'Precocibec', 'Mackabec', and 'Itabec'.

(c) The crack resistant trait and heavy setting ability from PI 263726, L. esculentum from Puerto Rico, were used in two cultivars released in Quebec. They are 'Yorkbec' and 'Usabec'.

b. Accomplishments at the Regional Station

(1) New agronomic, horticultural and industrial plant introductions received in 1974 totaled about 1120, including ornamentals. This total also includes 150 tomatoes collected in a special exploration in Peru and Ecuador and a collection of more than 550 radish introductions for which this station has assumed responsibility for future maintenance. For seed increase and revitalization, more than 1700 were grown plus about 700-800 perennial accessions carried over from 1973. Special purpose plantings (1070 accessions) included 150 corn accessions for corn borer resistance screening, 150 peppers also for corn borer resistance screening, 120 corn accessions for disease resistance and 650 tomatoes for fruit rot resistance screening. Plant material distributed amounted to more than 10,000 items (estimated) of seed packets and plants.

(2) Plant introductions were evaluated in the field and greenhouse for disease and insect resistance.

(a) Disease screening: Of 120 corn lines already showing some resistance to rust in previous tests, 15 had no rust by late August. A later reading was prevented by an early frost in September. Rhizoctonia fruit rot evaluations on 650 tomato lines were also cut short by frost but 13 lines showed no rotted fruits in the single test accomplished. Powdery mildew resistance of 42 PI lines and 27 cucumber cultivars was evaluated in the greenhouse in replicated tests. After several tests, the best resistance to our Iowa isolate of Sphaerotheca fuliginea appears to be in PI's 233646, 236468, 288238, and cultivars Chipper, Galaxy, and Poinsett.

(b) Tomato exploration: A tomato exploration to Colombia, Ecuador, and Peru netted 158 new collections of Lycopersicon, including 20 L. esculentum, 29 L. esculentum var. cerasiforme, 16 L. hirsutum, 27 L. peruvianum, and 66 L. pimpinellifolium. We will attempt to grow all of these in the field at Ames in 1975.

(c) Insect resistance screening: 1) Corn introductions were screened for resistance to second generation European corn borer. Numerous sources of resistance to the first generation are available. All corn introductions that were infested in July and early August were susceptible. Establishment of borers was low in corn infested in mid and late August owing to cool weather in late August and September. These introductions will be re-evaluated in 1975. 2) Corn and other grass species were screened for resistance to the armyworm. Old open pollinated varieties formerly grown in the North Central United States were evaluated. Several entries of sorghum, millet, and weedy grasses were included as a comparison. All plants tested were highly susceptible to armyworm feeding with the exception of barnyard grass which was somewhat less preferred as a host. 3) Peppers were screened for resistance to European

borer. Only sweet peppers were evaluated inasmuch as the pungent (hot) peppers have a high level of resistance. All sweet peppers that were evaluated were susceptible. 4) Natural infestations of insects were noted at the Plant Introduction Farm at Ames throughout the summer of 1974. Some damage was done to Melilotus spp. by sweet clover weevil and to Brassica napus by cabbage aphid. Light infestations of corn leaf aphid and western corn rootworm beetles were noted in corn. Light infestations of melon aphids occurred in some of the cucurbits. None of these infestations required insecticides for control. However, it was necessary to apply insecticide to control cucumber beetles on cucurbits and potato leafhobber on Medicago spp.

(3) Ornamental evaluation and distribution:

(a) Tree and shrub plants distributed to 35 cooperators on request totaled 1204 plants. Ten year reports on 10 trial items were prepared.

(b) Seedling shrubs and trees from Yugoslavia will be placed in regional trial and offered to arboreta.

(c) New introductions: Hypericum sp., 325351, USSR. Erect, 30 cm; Hypericum perforatum, 371528, USSR, procumbent, mat forming; Salvia horminum, 383836, Yugoslavia, annual, erect with flowers; Potentilla fruticosa, 371536, Siberia, seed from garden plants, many flowers in cymes.

(d) Regional Station Trial: Linum flavum, 371837, petals clear yellow, a part hardy, somewhat woody perennial; Zanthoxylon schinifolium, 98387, China, one plant survived winter injury out of 102 planted in 1972. This plant is not hardy. It lost 2/3 of its top to winter injury in 1972-73 and again in 1973-74; Evodia danielli, 76056, USSR, 8 of 196 planted in 1972 survived the 1972-73 winter; Colutea orientalis, 369222, USSR, 47 plants winter injury appeared to be 2/3 of top with new sprouts from 4 inches or below; Ligustrum vulgare, 369694, 369695, Yugoslavia, winter injury confined to tip of stem; Betula tatewakiana, Hokkaido, Japan, 296019, seems to be hardy and slow growing.

c. Domestic Exploration: Progress made for collecting native pecans continues, as does the search for superior trees. Herbarium samples from trees selected for inclusion into the NC-7 collection have been taken. Exploration continues in the river valleys and visits to selected sites and trees are made more than once a year to obtain data and collect nuts. In Kansas, about 30 trees have been located and documented.

d. Regional Cooperative Program: The Ohio Station assisted with the increase and evaluation of another 150 tomato introductions in 1974. The Nebraska and Indiana Stations continue to evaluate new alfalfa introductions for insect resistance and data is given to the Regional Station. Other stations in the region are also assisting with this work.

4. USEFULNESS OF FINDINGS:

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. The evaluation of plant introductions and the exchange and 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 (1) program of seed increase, storage, preliminary evaluation; (2) pathology and entomology screening and evaluation work; (3) check new plant introductions for abnormalities; (4) local and regional testing of new crops and ornamentals; and (5) coordination of regional cooperative program.

b. Assist the Missouri and other stations with domestic exploration for native pecans in the southern part of the region.

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.

a. Regional Station Publications

(1) Dodge, A. F. 1974. Ten year report on regional plants of ornamental and shelter plants in the North Central Region 1960-1969. North Central Regional Plant Introduction Station, Ames, Iowa, 10 pages, 10 tables.

b. State Station Publications

(1) Missouri

(a) Poehlman, J. M., D. T. Sechler, J. M. Yoke, E. E. Watt, R. E. Swindell, and M. H. Bashandi. 1974. Performance of the first international mungbean nursery. Missouri Agr. Exp. Sta. Special Report 158. 20 pages.

(b) Watt, E. E., R. E. Swindell, V. D. Oggarwol, W. Purivirojkul, E. C. Benham, D. E. Sechler, and J. M. Poehlman. 1974. Evaluation of mungbean (Vigna radiata (L.) Wilczek) strains at Columbia, Missouri, in 1974. Missouri AES Dept. of Agron. Misc. Publ. No. 74-6. 32 pages.

c. Journal Articles

(1) Minnesota

(a) Hovin, A. W., H. L. Thomas, and I. T. Carlson. 1974. Registration of NCRCI reed canarygrass germplasm. Crop Sci. 14(1):130.

(2) Nebraska

(a) Coyne, D. P. and M. L. Schuster. 1974. Differential reaction of pods and foliage of beans (Phaseolus vulgaris) to Xanthomonas phaseoli. Plant Disease Reptr. 58(3):278-282.

(b) Newell, L. C. 1974. Registration of Oto Indiangrass. Crop Sci. 14(2):338.

(3) North Dakota

(a) Zimmer, D. E. Physiological specialization between races of Plasmopara halstedii in America and Europe. Phytopathology 64(11):1465-1467.

(4) Wisconsin

(a) Gutierrez, Maria, V. E. Green, and G. E. Edwards. 1974. Biochemical and cytological relationships in C_4 plants. Planta Berl. 119:279-300.

(b) Hagedorn, D. J. and R. E. Rand. 1974. Reaction of Phaseolus vulgaris to bean root rot in Wisconsin. Plant Disease Reptr. 58(3):229-232.

(5) USDA, Beltsville

(a) Barksdale, T. H. 1974. Evaluation of tomato fruit for resistance to rhizoctonia soil rot. Plant Disease Reptr. 58(5):406-408.

7. APPROVED:

Jan 20, 1975
Date

Chairman, Technical Committee
K. J. Lessman

1/23/75
Date

Regional Administrative Adviser
R. W. Hougas

MISCELLANEOUS PUBLICATIONS

1. Printed Publications

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

a. Alfalfa

(1) Beard, D. F. and I. I. Kawaguchi. 1974. Registration of WL 309 alfalfa. Crop Sci. 14(2):337.

b. Carrots

(1) Pfleger, F. L., G. E. Harmon, and G. A. Marx. 1974. Bacterial blight of carrots: interaction of temperature, light, and inoculation procedures on disease development of various carrot cultivars. Phytopathology 64(5):746-749.

c. Brassica and crambe

(1) Armstrong, G. M., and Joanne K. Armstrong. 1974. Wilt of Brassica carinata, Crambe abyssinica and C. hispanica caused by Fusarium oxysporium F. sp. conglutinans race 1 or 2. Plant Disease Reptr. 58(5):479-480.

d. Sunflowers

(1) Cummins, D. G., J. E. Marion, J. P. Craigmiles and R. E. Burns. 1967. Oil content, fatty acid composition, and other agronomic characteristics of sunflower introductions. J. Amer. Chem. Soc. 44(10):581-582.

e. Tomatoes

(1) Jones, J. P. and Pat Crill. 1974. Susceptibility of "resistant" tomato cultivars to Fusarium wilt. Phytopathology 64(12):1507-1510.