

**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, 1973

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. **COORDINATING 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	*B. Patterson	North Dakota	*G. A. Peterson
Iowa	*I. T. Carlson	Ohio	*M. H. Niehaus, Sec'y
Kansas	*G. E. Wassom	South Dakota	*R. M. Peterson
Michigan	*R. L. Andersen	Wisconsin	*W. H. Gabelman
Minnesota	*L. C. Snyder		

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

Vacancy

Northern Regional Research Laboratory

\*W. H. Tallent

U.S. Forest Service

\*D. H. Dawson

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 1973, 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 describe their value in greater detail are provided in Appendix C of this report, titled "Promising Plant Introductions for 1972".

(1) Alfalfa

(a) PI 141462 from Iran contributed stem nematode resistance to the variety WL 450 released in 1972.

(b) Five alfalfa introductions contributed to the germplasm release, 5-An2.

(2) Canarygrass (annual)

PI 251390 from Iran was released as the variety 'Robbin' by the Minnesota AES on April 1, 1973. This introduction consistently outyielded the 'Minn-Dak' check variety in trials at Rosemount and Robbin, Minnesota. 'Minn-Dak' was superior to other commercial sources in the U.S. and to most foreign introductions.

(3) Corn

Two corn introductions, PI's 217407, 'Ladyfinger Pop' and 221871, 'Delta Prolific White' were found to be resistant to Yellow Leaf Blight, Phyllosticta zeae at the Wisconsin AES.

(4) Crambe

Two Crambe introductions contributed to the variety, 'Meyer', released by Purdue University in 1973. 'Meyer' was developed by selection among progenies from crosses between breeding lines of PI 247310, Crambe abyssinica from Sweden and PI 279346 designated C. hispanica from Ethiopia.

(5) Foxtail millet

PI 315088, Setaria italica from USSR was released by the U.S. Central Great Plains Field Station, Akron, Colorado as the variety 'Butte' in 1973. 'Butte' is a bulk selection from PI 315088 and is being released as a head ("spray") type for the birdseed industry of northeastern Colorado.

(6) Sunflowers

(a) PI's 192943 from China and 228345 from Iran have resistance to race 1 of sunflower rust and are being used in a commercial breeding program in Minnesota.

(b) The Agricultural Research Service, USDA and the Texas and North Dakota Agricultural Experiment Stations jointly released a recessive branching, downy mildew resistant, fertility restorer line named RHA 471. This hybrid is a cross between a cytoplasmic male-sterile three-way cross (cms PI 343765 x HA 119) x HA 62-4-5 and a selection from the restorer line RHA 265. RHA 271 has male sterile cytoplasm from PI 343765, a cytoplasmic male sterile introduction from France. HA 119 is a selection from Jdanovsky 82.81 (PI 265100), an open pollinated variety introduced from the USSR.

(c) Seven sunflower introductions were received from Russia that reportedly ranged from 69.7% to 71.44 oil in the kernel and 59.0% to 60.1% oil in the entire seed.

(7) Beans

(a) Five bean, Phaseolus vulgaris, introductions were found to have high tolerance to Nebraska strains of Xanthomonas phaseoli, common blight bacterium.

(b) PI 207262 from Colombia shows very high tolerance to common and fuscous bacterial blights and will be used as an additional source of tolerance in a breeding program at the Michigan AES.

(8) Peas

Two pea introductions from Ethiopia were found to have resistance to pea seed borne mosaic virus (Pea Fizzletop Virus). They are PI's 193586 and 193835. Resistance is conditioned by the same single, recessive gene.

(9) Tomatoes

(a) Two wild species of tomato, Lycopersicon pimpinellifolium, were reported as being resistant to the Reniform Nematode, Rotylenchus veniformis. They are PI's 270453 from Mexico and 375937 (a selection from another PI) from Beltsville, Maryland. The latter number was consistently high in resistance, thus exhibiting its homozygosity for this trait.

(b) PI 129080, Lycopersicon esculentum from Colombia, is resistant to southern bacterial wilt.

(c) Germplasm from PI 273446 (Filipino No. 2), L. esculentum from the Philippines, was used in the variety 'Ohio 2470' released by the Ohio Agricultural Research and Development Center in December, 1972.

b. Accomplishments at the Regional Station

(1) New agronomic, horticultural and industrial plant introductions received in 1973 totaled about 550, including ornamentals. For seed increase and revitalization, more than 2,900 accessions were grown, including 700-800 perennial accessions carried over from 1971. Special purpose plantings (750 accessions) included 127 corn accessions for corn borer resistance screening, 325 tomatoes for fruit rot resistance, 150 corn for rust and stalk rot resistance, and 148 peppers for European corn borer resistance. Plant material distributed amounted to more than 12,000 items (estimated) of seed packets and plants.

(2) The quarantine on corn from several parts of the world, including the Philippines, Thailand, Africa, etc., materially reduced the number of incoming corn introductions. This will continue until procedures are developed at some location to increase corn under strict quarantine conditions. We are not equipped for this at our Regional Station except in a very limited way, like two or three accessions per winter season.

(3) Improvements and repairs were made to certain facilities at the Plant Introduction Farm. One of the more important improvements was that of lowering the relative humidity in the seed storage room. By means of reducing the speed of the unit cooler fans and providing extra heat by means of 12 200-watt light bulbs in the ceiling, we succeeded in lowering the RH from an average of 70-75% to 40-45%. During the winter, the RH is 40% or less.

(4) The interior of the farm greenhouse was lined with plastic to provide insulation. The reasons are twofold: (1) to help keep the house warmer during cold spells in the winter and (2) to save fuel. Both objectives are being accomplished.

(5) Plant introductions were evaluated in the field and greenhouse for disease and insect resistance:

(a) Disease screening: Another 325 lines of tomatoes were evaluated for *Rhizoctonia* soil rot of fruits. Mature fruits were collected from the field for exposure to infection in sand benches.

Three lines, PI's 193407, 205001, and 205004, which showed evidence of resistance in previous tests, were included in this year's test, also.

Lines showing 50% or less, rotted fruits in the first test were subjected to a second, third, and even fourth test, if they continued to stay below 50% rotted fruits. The only lines still showing good resistance after three tests were: PI's 205001, 263589, 270448, 272648, and 272649.

Sixty four corn introductions were planted in a rust nursery. Of these, eight were highly susceptible and acted as inoculum sources in the nursery. The most resistant lines were PI's 172332, 186191, 186196, 186197, 186209, 186215, 186223, 190081, and 198901. The type of resistance detected in this test was mature plant resistance.

*Diplodia* stalk rot evaluations were made on 84 corn introductions previously showing some evidence of resistance. Fifteen accessions showed good resistance.

(b) Disease control and identification: Sunflower downy mildew is still considered one of our more serious seed-borne pests. Control is effected by growing new accessions for three consecutive years, during which time any systemically infected plants are burned. Accessions must show no infected plants for three years before seed is harvested for distribution.

Two introductions of corn and one of Panicum were grown in the greenhouse under post entry quarantine, using supplemental lights. No abnormalities were found in the corn but the Panicum (which also contained Setaria and Echinochloa will be re-grown for observation. Good seed increases were obtained.

(c) Insect resistance screening: A total of 148 pepper introductions were evaluated in the field for resistance to larvae of the European corn borer. Fruits were artificially infested with laboratory produced egg masses. Only sweet peppers were evaluated inasmuch as previous data demonstrated that pungent peppers are resistant to the borer. All sweet peppers evaluated this year were susceptible.

A total of 127 corn introductions were screened in the field for resistance to second generation larvae of the European corn borer. The following eight introductions had fewer stalk cavities than the inbred, B-52 (resistant check): PI's 172324, 172327, 172328, 194389, 194791, 195113, 195239, and 195240. However, these introductions should be further evaluated.

Crambe and other cruciferous oilseeds were evaluated for resistance to cabbage looper and imported cabbage worm. All were susceptible.

A technique was developed for successfully rearing armyworms in the laboratory. Preliminary screening of a few corn introductions for armyworm resistance showed some minor differences among accessions but none were resistant.

No insect problems were developed on any new or experimental crops being grown at the Plant Introduction Farm in 1973.

(d) Ornamental plant distribution: Tree and shrub plants distributed to 35 cooperators on request totaled 1,152 plants. In addition, lily bulbs were sent to two cooperators.

Ten 10-year reports on 13 trial items and three 5-year reports on 4 items were prepared.

(e) Ornamentals evaluation: Seed of shrubs and trees from Yugoslavia were stratified and are beginning to germinate. Plants of several herbaceous perennials, largely from Siberia were planted out for observation and seed production. In addition, Potentilla fruticosa, PI's 369302, 369303, 369307, 369308; and Rosa rugosa, PI 369316, all from Siberia, are being evaluated for dwarfishness and other attributes.

About 622 introductions of ornamentals representing 147 genera are on hand as plants or as seed in storage. These include herbaceous annuals and perennials as well as trees and shrubs. Plants of cinquefoil, Rugosa Rose, Daylily and Formosa Lily appear to be unique.

Additional and more detailed information on individual species and introductions appears in Appendix D of this report.

c. Domestic Exploration: Progress during the first year was not as good as expected by the leaders of this work. Reasons are that this is a new endeavor in this area of nut crops work and procedures for this new work had to be established and communicated to all participants. New concepts as to what genetic traits to look for in the tree, as well as nuts, had to be developed. Further, heavy rains during the fall and spring seriously impeded travel and mobility into the collecting areas.

However, workers in Illinois, Iowa and Missouri were able to get into the field for a limited time and make selections. Kansas conducted a survey and labeled selections for further observation. Further explorations are planned in these four states.

d. Regional Cooperative Program: The Ohio Station assisted with the increase and evaluation of another 150 new tomato introductions in 1973. The Nebraska and Indiana Stations continue to evaluate new alfalfa introductions for insect resistance. 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) Bodge, A. F. 1973. Five-year report on regional plantings of ornamental and shelter plants in the North Central Region 1966-1970. North Central Regional Plant Introduction Station, Ames, Iowa. 3 pp. 3 tables.

(2) Dodge, A. F. 1973. Ten-year report on regional plantings of ornamental and shelter plants in the North Central Region 1959-1968. North Central Regional Plant Introduction Station, Ames, Iowa. 10 pp. 10 tables.

b. State Station Publications

(1) Nebraska

(a) Coyne, D. P. and M. L. Schuster. 1972. Evaluation of common blight and bacterial wilt tolerant Great Northern dry bean breeding lines and varieties in 1972. Vegetable Res. Rep., Nebraska Agr. Exp. Sta., Dept. of Hort. and Forestry PR 99:1-2.

(b) Coyne, D. P. and M. L. Schuster. 1972. Additional Phaseolus germplasm tolerant to common blight bacterium (Xanthomonas phaseoli). Vegetable Res. Rep., Nebraska Agr. Exp. Sta., Dept. of Hort. and Forestry PR 99:4.

(c) Coyne, D. P. and M. L. Schuster. 1972. First report of a qualitative genetic control of the reaction to common blight bacterium (Xanthomonas phaseoli) in beans. Vegetable Res. Rep., Nebraska Agr. Exp. Sta., Dept. of Hort. and Forestry PR 99:5-6.

(d) Schuster, M. L., D. P. Coyne and Betty Hoff. 1972. Comparative virulence of Xanthomonas phaseoli strains from Uganda, Colombia, and Nebraska. Vegetable Res. Rep., Nebraska Agr. Exp. Sta., Dept. of Hort. and Forestry PR 99:6.

(e) Steadman, J. R., and D. P. Coyne. 1972. Evaluation of plant introduction lines of Phaseolus vulgaris for root rot disease reaction and other characteristics. Vegetable Res. Rep., Nebraska Agr. Exp. Sta., Dept. of Hort. and Forestry PR 99:22-23.

c. Journal Articles

(1) Illinois

(a) Hooker, A. L. and Soon Kwon Kim. 1973. Monogenic and multigenic resistance to Helminthosporium turcicum in corn. Plant Disease Repr. 57(7):586-589.

(2) Indiana

(a) Meier, V. D. and K. J. Lessman. 1973. Breeding behavior for crosses of Crambe abyssinica and a plant introduction designated C. hispanica. Crop Sci. 13(1):49-51.

(b) Meier, V. D. and K. J. Lessman. 1973. Heritabilities of some agronomic characters for the interspecific cross of Crambe abyssinica and C. hispanica. Crop Sci. 13(2):237-240.

(3) Iowa

(a) Wilson, R. L. and D. C. Peters. 1973. Plant introductions of Zea mays as sources of corn rootworm tolerance. J. Econ. Entomol. 66(1):101-104.

(4) Kansas

(a) Sharma, G. C. and C. V. Hall. 1973. Relative attractance of spotted cucumber beetle to fruits of fifteen species of Cucurbitaceae. Environmental Entomol. 2(1):154-156.

(5) Nebraska

(a) Coyne, D. P. and M. L. Schuster. 1973. Phaseolus germplasm tolerant to common blight bacterium (Xanthomonas phaseoli). Plant Disease Repr. 57(2):111-114.

(b) Hill, K., D. P. Coyne, and M. L. Schuster. 1972. Leaf, pod, and systemic chlorosis reactions in Phaseolus vulgaris to halo blight controlled by different genes. J. Amer. Soc. Hort. Sci. 97(4):494-498.

(c) Schuster, M. L., D. P. Coyne, and Betty Hoff. 1973. Comparative virulence of Xanthomonas phaseoli strains from Uganda, Colombia, and Nebraska. Plant Disease Repr. 57(1):74-75.

(6) North Dakota

(a) Bugbee, W. M. 1973. Resistance in Beta vulgaris to Phoma storage rot in the North Central Region. Plant Disease Repr. 57(3):204-207.

(b) Zimmer, D. E., M. L. Kinman, and G. N. Fick. 1973. Evaluation of sunflowers for resistance to rust and verticillium wilt. Plant Disease Repr. 57(6):524-528.

(7) Ohio

(a) Emmatty, D. A. and C. A. John. 1973. Evaluation of resistance to bacterial canker of H 2990, a new tomato variety. Plant Disease Repr. 57(7):584-586.

(8) Wisconsin

(a) Bliss, F. A., P. T. Onesirosan and D. C. Army. 1973. Inheritance of resistance intomato to target leaf spot. Phytopathology 63(7):837-840.

(b) Hagedorn, D. J. and E. T. Gritton. 1973. Inheritance of resistance to the pea seed borne mosaic virus. Phytopathology 63:1130-1133.

(9) USDA, Beltsville

(a) Devine, T. E., C. H. Hanson, S. A. Ostazeski and O. J. Hunt. 1973. Registration of alfalfa germplasm. Crop Sci. 13(2):289.

(b) Rebois, R. V., B. Joe Eldridge, J. M. Good, and A. K. Stoner. 1973. Tomato resistance and susceptibility to the reniform nematode. Plant Dis. Repr. 57(2):169-172.

(c) Singh, R. P. and Mariel J. O'Brien. 1970. Additional indicator plants for potato spindle tuber virus. Amer. Potato J. 47(10):367-371.

7. APPROVED:

Jan 22, 1974  
Date

K. J. Lessman  
Chairman, Technical Committee  
K. J. Lessman

1/31/74  
Date

R. W. Hougas  
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. Bluegrass (This is not an NC-7 priority crop but the publication reports on a collection of Poa from Alaska.)

(1) Pflieger, F. L. 1973. Reaction of Poa pratensis introductions to Puccinia graminis. Plant Disease Repr. 57(7):595-598.

b. Crambe

(1) Massey, J. H. and M. D. Jellum. 1973. Effects of spring planting date and row spacing on the agronomic characteristics and chemical composition of crambe. Agron. J. 65(2):299-300.

c. Alfalfa

(1) Pflieger, F. L. and D. B. Dolan. 1973. Field resistance to Pseudopeziza medicaginis in Medicago spp. Plant Disease Repr. 57(5):468-471.

d. Tomatoes

(1) Bashi, Esther, M. Pilowsky and J. Rotem. 1973. Resistance in tomatoes to Stemphylium floridanum and S. botryosum f. sp. Lycopersici. Phytopathology 63(12):1542-1545.

(2) Clayberg, C. D. 1971. Screening tomatoes for ozone resistance. HortScience 6(4):386-397.

(3) Clayberg, C. D. 1972. Evaluation of tomato varieties for resistance to ozone. Conn. Agr. Exp. Sta. Circular 246, 11 pages.