

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, 1975

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

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

U.S. Department of Agriculture

ARS Germplasm Resources Laboratory

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North Central Regional Plant Introduction Station, Ames, Iowa

Regional Coordinator

W. H. Skrdla

Research Horticulturist

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Research Plant Pathologist

R. L. Clark

Research Entomologist

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3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS:

A. Introductions Having Special Value

Described below are plant introductions, reported by cooperators in 1975, 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 1975."

(1) Alfalfa

(a) Four experimental synthetics have been developed from hybrids between cultivated alfalfa and wild diploid alfalfa reported as having tolerance or resistance to the alfalfa weevil. The four experimentals, W70-22 (diploid), W-71-42, W71-47, and W72-48 (tetraploids), were released by the Wisconsin AES. Fifteen PI's were used in W70-22, nineteen in W71-42, one in W71-47, and nineteen in W72-48. The experimentals were released to provide a general source of wild genes at the tetraploid level and to permit screening for weevil resistance in regions with severe weevil infestation.

(b) PI 141462 from Iran contributed stem nematode resistance to the cultivar, WL450.

(c) PI 279958 from Kayseri, Turkey, was used in the variety 'Deseret', released jointly by the Utah AES and USDA-ARS in 1975. It was produced by two cycles of phenotypic recurrent selection within the accession, 279958. The variety has good resistance to stem nematode, downy mildew, and bacterial wilt.

(d) The development of two North Central region alfalfa germplasm pools, NC-83-1 and NC-83-2 was described in the 1974 report. In 1975, seed of these two pools was harvested and cleaned and 600 pounds of each was placed at the Regional Station for distribution. One pound of seed of each pool will be used to fill requests for seed.

(2) Sweetclover (Yellow)

(a) PI 178985 from Turkey yielded the large seeded selection N-13 (Nebraska), which produced larger seeds than 'Madrid' and plants that were superior to 'Madrid' in all attributes measured for both spring and fall seedings.

(b) The Nebraska station also made a large seeded selection from PI 227594 from Tunisia.

(3) Proso Millet (*Panicum miliaceum*)

PI 170603 from Turkey was used in the variety 'Cerise' released by the Nebraska station in 1974. It resembles 'Turghai' but produces slightly better yields.

(4) Millet (*Panicum milioides*)

A species, *P. milioides* has been found which apparently has a reduced rate of photorespiration compared with other C₃ plants. It photorespired less than tall fescue and more than *P. maximum*. Five PI's were used in the evaluation test.

(5) Eastern Gamagrass

PM-K-24 Eastern Gamagrass, *Tripsacum dactyloides* (L.)L was released by the Kansas AES and the SCS. It traces to seed collections from natural stands of Eastern Gamagrass in Kansas and Oklahoma, with NC-7 assistance, in 1958.

(6) Western Wheatgrass

'Flintlock' Western Wheatgrass, *Agropyron smithii* Rydb., released jointly by the Nebraska AES and the USDA-ARS in 1975. 'Flintlock' traces to plant selections from 30 collections made in 1957 from natural grasslands of central and southwestern Nebraska and northwestern Kansas, with NC-7 assistance.

(7) Tomato

(a) PI 263726 from Puerto Rico was used in the parentage of two varieties released in Canada, 'Canabec Super' and 'Rosabec', in 1975. The PI contributed *Alternaria* resistance to 'Canabec Super'.

(b) PI 255849 from Italy is early maturing and was used in making a large number of crosses with its derivatives.

(8) Sunflower

PI 343765 was used in the sunflower parental lines, RHA 273 and RHA 274 as a source of cytoplasmic male sterility.

(9) Tickbean

'Petite' tickbean (*Vicia faba* L. *minor*), a selection from PI 222129, Afghanistan, was released by the Minnesota AES. The unique characteristic of 'Petite' is its small seed. It is of light tan color with a black hilum. Petite was the highest yielding tickbean tested and was equal in yield to the highest yielding horsebean (*Vicia faba* L. *equina* Pers.) tested. The plant is a small, determinate bush, moderately late in blooming, but matures more rapidly and uniformly than most varieties of fababeans.

B. Accomplishments at the Regional Station

(1) New agronomic, horticultural and industrial plant introductions received in 1975 totaled about 800, including ornamentals. This included 80 accessions of corn from Yugoslavia through the PL 480 project. For seed increase and revitalization, more than 2100 were grown plus about 1000-1100 carried over from 1974.

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 11,000 items of seed packets and plants.

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

(a) Disease screening: Another 688 tomato introductions were screened for resistance to Rhizoctonia fruit rot. The best resistance in this year's test was exhibited by PI 294449, the variety 'Santa Cruz', from Brazil. Also looking very resistant was PI 303791, the variety 'Summer Prolific', which entered the plant introduction system from Ohio.

Diplodia stalk rot evaluations were made on 90 introductions in a replicated, inoculated field test. The best resistance appeared in the following PI's: 222618 (an open-pollinated variety, Hays Golden, from Kansas), 262484 (a dent line from Russia), 267203 (another Russian dent), and 360877 (a H. maydis resistant dent from Georgia). Twelve other lines also looked promising: 186187, 186189, 186231, 210404, 222629, 262495, 269751, 270080, 274011, 358282, 363067, and 372161, all rating at least as good as the stalk rot resistant check line AES704. Data on rust reactions were taken on 120 corn lines in a field rust nursery, Eleven PI's (193652, 193907, 194047, 194388, 194389, 196127, 196129, 197503, 210405, 221832, and 240326) rated less than 1.5 on a 0-5 scale, where 5 is most severe.

Squash mosaic virus (identified on the basis of symptoms only) was seed-borne in seven Cucumis sativus introductions (379283, 385968, 390242, 390249, 390253, 391568, and 391572) and one Cucurbita pepo (379313). Infected seedlings were destroyed.

(b) 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. Some differences in susceptibility among introductions was noted but none were resistant.

2/ Peppers were screened for resistance to European corn borer. All sweet peppers that were evaluated were susceptible.

3/ Cruciferous oilseeds (9 Brassica spp. and 2 Crambe spp.) were evaluated for resistance to the cabbage aphid. Accessions of C. juncea were resistant; others were susceptible.

4/ Sunflowers were observed for resistance to sunflower moth following heavy natural infestation. Accessions with large heads were heavily infested with the exception of PI 204578 which was not infested. This accession was grown in isolation and could be an escape. Small flowered, wild types of sunflowers had a lighter infestation than did the commercial types.

5/ Natural infestations of insects were noted at the Plant Introduction Farm at Ames throughout the 1975 growing season. Light infestations of corn leaf aphid and corn rootworm beetles occurred in corn. Light to moderate damage was done to plantings of Brassica napus by cabbage looper and imported cabbage worm. Other Brassica spp. was not damaged. It was necessary to apply insecticide to control cucumber beetles on cucurbits, potato leafhopper on alfalfa, and sunflower moth on sunflowers.

(3) Ornamental evaluation and distribution: Cooperators at 33 trial sites in the NC Region planted six trees, nine shrubs and two perennials or a total of 1280 plants as a part of the regional trial program of the NC-7 ornamental plants sub-committee. At the same time, ten of the Region's arboreta received 498 plants of 32 introductions.

Five-year performance reports on regional plantings of Betula nigra, Celastrus loeseneri, Chaenomeles 'Cherry Red', Crataegus succulenta, Juniperus horizontalis 'Admerabilis', J. h. 'Pulchellus', Quercus robur fastigiata, Salix elaeagnos PI 265667, Sorbus scopulina, Spiraea japonica alpina, Spiraea 'Snowwhite', Taxus media 'Wardi', and ten-year reports on Caragana 'Globe', Lonicera 'Dropmore', Lonicera 'Morden Orange', Malus 'Henry F. DuPont', Malus 'Liset' and Malus 'Van Eseltine'

were summarized, duplicated and returned to cooperators.

Observed differences among plants of Potentilla fruticosa and Linum flavum from Siberia warrant further observation with respect to plant size, shape and vigor, amount of flowers, flower color, size, and duration of flowers, foliage color and freedom from pests.

(c) Domestic exploration: Exploration for superior pecans continues. The states of Missouri, Kansas, and Illinois are cooperating in this venture. The work is still in the exploratory phase, i.e., to search for and locate superior trees. Later, collections of nuts and scionwood will be made.

(d) Regional Cooperative Program: The Ohio station assisted with the increase and evaluation of another 150 tomato introductions in 1975. The Nebraska and Indiana stations continue to systematically evaluate new alfalfa introductions for insect resistance and data is given to the Regional Station. Other stations in the region continue to evaluate plant introductions, as needed, in search of desired plant traits for inclusion in their breeding programs.

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 (author(s) is a member of the Regional Station staff):

(1) Clark, R. L. 1975. Powdery mildew resistance in plant introductions of cucumber in Iowa. Plant Disease Repr 59(12): 1024-1028.

(2) Clark, R. L., J. L. Jarvis, S. W. Braverman, S. M. Dietz, G. Sowell, Jr., and H. F. Winters. 1975. A summary of reports on the resistance of plant introductions to diseases, nematodes, insects, mites and chemicals. Lycopersicon spp. (Printed report distributed by NC-7 to tomato researchers around the country). 70 pp.

(3) Sowell, Grover, Jr., S. W. Braverman, R. L. Clark, S. M. Dietz, and H. F. Winters. 1975. A summary of reports on the resistance of plant introductions to diseases, insects, and nematodes. Vigna spp. (Southern pea or cowpea). (Printed report distributed by S-9 to Vigna researchers around the country). 8 pp.

b. State Station Publications - none.

c. Journal Articles

(1) Indiana

(a) Beck, L. C., K. J. Lessman, and R. J. Buker. 1975. Inheritance of pubescence and its use in outcrossing measurements between a Crambe hispanica type and C. abyssinica Hochst. ex R. E. Fries. Crop Sci. 15(2): 221-224.

(b) Ohm, H. W., F. L. Patterson, J. J. Roberts, and G. E. Shaver. 1974. Registration of stout oats. Crop Sci 14(6): 906.

(2) Missouri

(a) Trinklein, D. H. and V. N. Lambeth. 1975. Heritability of blossom-end rot. *Tomato Genet. Coop. Rep.* 25: 22-23.

(b) Zuber, M. S., W. H. Skrdla and Bong Ho Choe. 1975. Survey of maize selections for endosperm lysine content. *Crop Sci.* 15(1): 93-94.

(3) Nebraska

(a) Haskins, F. A. and H. J. Gorz. 1975. Influence of seed size, planting depth, and companion crop on emergence and vigor of seedlings in sweet-clover. *Agron. J.* 67(5): 652-654.

(b) Kehr, W. R., D. K. Barnes, E. L. Sorenson, W. H. Skrdla, C. H. Hanson, D. A. Miller, T. E. Thompson, I. T. Carlson, L. J. Elling, R. L. Taylor, M. D. Rumbaugh, E. T. Bingham, D. E. Brown, and M. K. Miller. 1975. Registration of alfalfa germplasm pools NC-83-1 and NC-83-2. *Crop Sci.* 15(4): 604-605.

(c) Nelson, L. A. 1975. Registration of Cerise proso millet. *Crop Sci.* 15(1): 98.

(4) North Dakota

(a) Ashri, A., D. E. Zimmer, A. L. Urie, A. Cahaner, and A. Marani. 1974. Evaluation of the world collection of safflower, *Carthamus tinctorius* L. IV. Yield and yield components and their relationships. *Crop Sci.* 14(6): 799-802.

(b) Fick, G. N., M. L. Kimman, and D. E. Zimmer. 1975. Registration of 'RHA 273' and 'RHA 274' sunflower parental lines. *Crop Sci.* 15(1): 106.

(c) Fick, G. N. and D. E. Zimmer. 1975. Influence of rust on performance of near-isogenic sunflower hybrids. *Plant Disease Repr.* 59(9): 737-739.

(5) Wisconsin

(a) Gritton, E. T. and D. J. Hagedorn. 1975. Linkage of the genes SBM and WLO in peas. *Crop Sci.* 15(3): 447-448.

(b) Renish, W. J., P. T. Onesirosan, F. A. Bliss, and D. C. Arny. 1975. Reaction of tomato to target leaf spot using spore inoculation and a toxin test. *HortScience* 10(2): 163-165.

(6) USDA, Beltsville

(a) Barksdale, T. H. and A. K. Stoner. 1975. Breeding for tomato anthracnose resistance. *Plant Disease Repr.* 59(8): 648-652.

(b) Orellana, R. G. 1975. Photoperiod influence on the susceptibility of sunflower to Sclerotinia Stalk Rot. *Phytopathology* 65(1): 1293-1298.

(c) White, G. A. 1975. Distinguishing characteristics of *Crambe abyssinica* and *C. hispanica*. *Crop Sci.* 15(1): 91-93.

7. APPROVED:

Date

1/22/76

Date

1/27/76M. H. NiehausChairman, Technical Committee
M. H. NiehausR. W. HougasRegional Administrative Adviser
R. W. Hougas

MISCELLANEOUS PUBLICATIONS

1. Publications

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

a. Alfalfa

(1) Kawaguchi, I. I. and D. F. Beard. 1975. Registration of WL 450, WL 451, WL 501-R and WL 600 alfalfa. Crop Sci. 14(6): 905.

b. Panicum

(1) Brown, R. H. and W. V. Brown. 1975. Photosynthetic characteristics of Panicum milioides, a species with reduced photorespiration. Crop Sci. 15(5): 681-685.

c. Tomato

(1) Gilbert, J., J. Tanaka, and K. Takeda. 1974. 'Kewalo' Tomato. HortScience 9: 481-482.