

ANNUAL REPORT OF COOPERATIVE REGIONAL PROJECTS
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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

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3. Indiana	*J. Janick, Chm.	10. N. Dakota	*J. Franckowiak
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5. Kansas	*C. E. Wassom	12. S. Dakota	*R. Peterson
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1. ARS Germplasm Resources Laboratory	G. A. White
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E. North Central Regional Plant Introduction Station, Ames, Iowa

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a. Research Leader and Research Plant Pathologist	R.L. Clark
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III. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

A. Introduction of new germplasm

New accessions entering the NC-7 Program in 1986 totaled 4373. Largest increases came in **Amaranthus (688)**, **Beta (131)**, **Cichorium (152)**, **Cuphea (209)**, **Helianthus (1374)**, **Lycopersicon (273)**, **Medicago (196)**, and corn (1064). Total NC-7 inventory now includes 27,462 accessions.

B. Germplasm Multiplication

Seed increases were attempted on: 120 **Amaranthus** accessions in the field, 81 **Daucus**, 32 **Petroselinum**, 106 cucumbers, 70 **Cucurbita pepo**, 266 tomato, and 17 radish accessions, 205 sunflowers, 432 corn (including 150 in a winter nursery in Puerto Rico), 450 tomato genetic stocks (Davis, CA), 120 beets (Logan, Utah), 44 **Cuphea** accessions, 270 **oilseed Brassica**, 162 **Setarias**, 172 annual **Medicagos**, and several hundred accessions of miscellaneous species. Pollination control in corn and large-headed sunflowers was by bagging heads, collecting pollen from all male flowers, and using the bulked pollen for sibbing. At least 200 plants are grown (when seed supplies are sufficient) and attempts are made to involve all plants in the sibbing process with at least 100 seed-bearers represented in the harvest. Hand pollination is also used with the **Cucurbita pepo** accessions, with bulked pollen used for sibbing on protected

female flowers. Cage increases are used for the following crops: wild sunflowers, cucumbers, most **oilseed** Brassicas, carrots, chicory, and parsley using honeybees and, for carrots and parsley, flies. The beet accessions are increased under isolation tents in Logan, Utah and the perennial alfalfa in cages using leafcutter bees at Reno, Nevada. In 1987, the alfalfa increases will be carried out in Prosser, Washington. Annual alfalfas are being grown in Riverside, California this year in a trial (400 accessions) to see if the climate and soil conditions there are suitable for these species.

C. Germolasm Distribution

Domestic seed requests from 230 individuals led to shipment of 16,427 packets of seed and 344 plants. Crops with at least 100 seed packets distributed in 1986 included: proso millet (359), foxtail millet (284), corn (1803), alfalfa (935 perennials and 747 annuals), cucumber (1088), pumpkin (392), carrot (247), tomato (5072), parsley (137), radish (129), spinach (511), amaranth (196), Brassica (3648), sunflower (1904), and Ocimum (165).

Foreign requests were received from 73 scientists and led to shipment of 2,753 packets overseas. Most often requested crops from foreign researchers were: proso millet (127 packets), foxtail millet (90), sweetclover (70), cucumber (261), pumpkin (155), carrot (98), tomato (139), radish (100), Brassica (1409), sunflower (125). Distribution of packets outside the North Central Region included: 4182 to the Western Region, 1748 to the Southern Region, 416 to the North East, and 4593 to Puerto Rico. We distributed 2488 packets within our Region and sent 905 backup seed lots to NSSL.

D. Germolasm Evaluation

1. Woody Ornamental Regional Trials.

Regional cooperators were sent 536 ornamental plants of 8 accessions for trial at 28 sites. An additional 114 plants of these accessions were sent to arboreta and botanic gardens. These accessions include four Soil Conservation Service selections and the first of many accessions to be distributed from the 1984 domestic plant explorations undertaken by Klett and Feucht in Colorado, Pair in Oklahoma, and Widrlechner in the Missouri River Valley.

2. Cooperator Evaluations

a. Vegetables

Four Canadian tomato varieties had PI 370093 in their pedigrees (Vetomold, V121, Harvestvee, and Ont 7710). Two others (Ontario Pink 774 and Ontario Red 775) had PI's 124161 and 126947 in their pedigrees.

The green fruited species L. hirsutum (PI 126445) is resistant to Alternaria solani (causal agent of early blight) toxin and is outstanding for tissue culture research because it regenerates well.

Cucumber powdery mildew resistant plants were found in PI 263046 and 321011 in Ohio. In a field test in Oregon, six cucumber accessions (PI 165509, 179678, 197085, 197086, 197087, and 372891) showed resistance to angular leafspot and powdery mildew.

Possible powdery mildew resistance was noted in a field test in Minnesota in the following six pea accessions: 167205, 179451, 244130, 250447, 343258, and 343325.

High yields were noted in the following nine bean accessions in Minnesota: 155212, 164314, 164778, 244053, 273488, 304827, 307806, 406158, and 406161.

Garlic accessions 493106 and 493112 were tolerant to pink root and Fusarium basal rot in Wisconsin. Pink root rot resistance was also reported in PI 493118.

b. Field Crops

Corn accessions were used in various programs for the following traits: leaf disease resistance, head smut resistance, rust resistance, black cutworm resistance, ability to emerge from **4-inch** planting depths, earliness, pink popcorn, yield, archeologic comparisons, and historic references in demonstration plantings.

Eighteen accessions of grasses (mostly Echinochloa spp.) were used in a NASA study on gravity responses of cereal grass shoots.

Proso millet cultivars Cerise and Dawn had PI's in their pedigrees (170603 and 260053, respectively). Two other **proso** millet accessions, PI 289336 and 463485, are being used as sources of earliness and white seeds. In tests in Indiana, six timothy accessions showed good fall growth and disease resistance, and two (371957 and 419855) also had good spring vigor.

Alfalfa accessions in various programs exhibited the following useful traits: resistance to anthracnose, Aphanomyces root rot, rust, and downy mildew (races I-5, I-7, and I-S), and **tolerance** to salt. Germplasm populations of alfalfa released by the U.S. Department of Agriculture, Agricultural Research Service, B-31, 3-32, and B-36, involved 14, 14, and 44 PI's respectively, collected in eastern Turkey. High nectar production was noted in three Lotus accessions (228233, 331177, and 472010) in Michigan.

c. Oilseed Crops

Sunflower accessions are being used as sources of purple-hulled seeds and resistance to Alternaria helianthi (PI 274518).

Biotechniques (anther culture to obtain haploids and somatic embryogenesis in vitro) are being used with Brassica napus (PI 431573) and Eruca (175141, 180441, and 255664), respectively, as excellent experimental model species.

3. Evaluations at NC-7

Corn accessions (116 accessions) were evaluated for silk feeding resistance to corn **earworm** by feeding neonate larvae fresh silks for six days. Eleven lines produced smaller larval weights than the resistant check. As part of the sunflower evaluation plan prepared by the CAC, 300 lines were evaluated in the field for sunflower moth feeding. Data were taken as the number and weight of seed per square centimeter of harvested heads. Lygus bug evaluations on 32 amaranth introductions showed 12 lines with greatly reduced insect buildup, when compared to susceptible lines.

Rhizoctonia fruit rot resistance of cucumber PI's 165509 and 197086, both from India, is controlled by more than one gene based on backcross and F2 population analyses. The Septoria leaf blight resistance of tomato PI 365960 is inherited as a single dominant gene, easily transferred by backcrossing. Northern and southern leaf blight evaluations were made on 400 corn accessions in the field. Data are being analyzed. Forty-four accessions of Cuphea (a **lauric** acid producer) were grown in the field to obtain seed and evaluate harvesting techniques while acquiring information on the variability within accessions and the Cuphea germplasm collection. It appears that leafcutter bees, under cages, significantly increase seed yields on C. laminuligera.

IV. USEFULNESS OF FINDINGS

Plant Introductions continue to provide valuable germplasm to plant scientists and represent sources of new plant traits, disease and insect resistance and new genotypes for use in physiologic, genetic, and molecular genetic research. Many accessions were requested for, and used in, biotechnology studies because they have proven to be excellent models in developing new techniques that can be applied to practical situations. Increased use of secondary and tertiary gene pools is now being realized, because of the success of these new biotechniques. This, in turn, allows - and promotes - increased utilization of our germplasm collections as usable sources of genes previously isolated from incorporation into commercial varieties.

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 pest resistance. Enhancement work will continue with cucumber fruit rot resistant material and Septoria blight resistant tomatoes. Cuphea germplasm will be evaluated for adaptation to commercial cultivation and seed storage. Two explorations for additional Cuphea germplasm are planned, one in the southeastern **U.S.**, the other in southern Brazil. A sunflower collecting trip is also planned for the northwestern United States. All three trips will involve at least one of our staff.

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

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

We will continue to support the maize genetic stock center, Urbana, Illinois, and the tomato genetic stocks collection in Davis, California.

We will continue to increase beet germplasm in isolation field tents in Logan, Utah, annual Medicagos in Riverside, California, and perennial Medicagos in cages at Prosser, Washington, a program previously carried out in Reno, Nevada.

VI. PUBLICATIONS:

A. From the Regional Station Staff

1. Guthrie, W. D., R. L. Wilson, J. R. Coats, J. C. **Robbins**, C. T. Tseng, J. L. Jarvis, and W. A. Russell. 1986. European Corn Borer (Lepidoptera: Pyralidae) Leaf-feeding Resistance and **DIMBOA** Content in Inbred Lines of Dent Maize Grown Under Field Versus Greenhouse Conditions. J. **Econ.** Entomol. 79: 1492-1496.
2. Roath, W. W., J. F. Miller, and T. Gulya. 1986. Registration of Sunflower Parental Lines HA821 and HA822. Crop Sci. 26: 217.
3. Roath, W. W. and M. P. Widrlechner. 1986. Sunflower pollen storage: Vital stain vs. seed set. Agron. Abstr. 1986: 79.
4. Widrlechner, M.P. 1986. Short term pollen storage of two Rhododendron ginsii Auculeivars R h o d o d e n d r o n **Soc.** 40: 144-146.
5. Wilson, R. L. and S. G. **McClurg**. 1986. Artificial oviposition substrate for infesting sunflower with eggs of the sunflower moth (Lepidoptera: Pyralidae). J. **Econ.** Entomol. 79: 545-547.

6. Wilson, R. L. and K. M. Wissink. 1986. Laboratory method for screening corn for European corn borer (Lepidoptera: Pyralidae) Resistance. *J. Econ. Entomol.* 79: 274-276.

B. From Others

1. **Anand**, S. C., J. A. Wrather, and C. R. **Shumway**. 1985. Soybean genotypes with resistance to races of soybean cyst nematode. *Crop Sci.* 25: 1073-1075.
2. **Arny**, D. C. and C. R. Grau. 1985. Importance of verticillium wilt of alfalfa in North America. *Canadian Journal of Plant Path.* 7: 187-190.
3. Baggett, J. R. and D. Kean. 1986. 'Oregon Spring' and '**Santium**' parthenocarpic tomatoes. *HortScience* 21: 1245-1247.
4. Berg, C. C., R. T. Sherwood, and K. E. Zeidersw. 1986. Recurrent Phenotypic Selection for resistance to Brown Leaf Spot in Smooth Bromegrass. *Crop Sci.* 26: 533-536.
5. Bernard, R. L. and T. Hymowitz. 1986. Registration of **L81-4590**, **L81-4871**, and **L83-4387** soybean germplasm lines lacking the Kunitz Trypsin Inhibitor. *Crop Sci.* 26:650-651.
6. Bernard, R. L. and T. Hymowitz. 1986. Registration of 2024 and **L82-2051** soybean germplasm lines with Kunitz trypsin inhibitor variants. *Crop Sci.* 26:6521.
7. Berry, S. Z. and W. A. Gould. 1986. 'Ohio 832 tomato. *HortScience* 21: 334.
8. Bretag, T. W. 1985. Fungi associated with root rots of annual **Medicago** spp. in Australia. *Trans. Br. Mycol. Soc.* 85(2): 329-334.
9. Campbell, T. A., J. Crock, J. H. Williams, A. N. Huang, R. E. Sigafus, A. A. Schneiter, E. F. **McClain**, C. R. Graves. 1986. Registration of 'Bellann' and 'Belenzain' **crambe**. *Crop Sci.* 26(5): 1082-1083.
10. Campbell, T. A., J. Crock, J. H. Williams, A. N. Huang, R. E. Sigafus, A. A. Schneiter, E. F. **McClain**, and C. R. Graves. 1986. Registration of C-22, C-29, C-37 **Crambe** germplasm. *Crop Sci.* 26(5): 1088-1089.H
11. **Carlson**, D. G., M. E. Daxenbichler, C. H. Van Etten, H. L. **Tookey**, C. B. Hill, and P. H. Williams. 1985. Glucosinolates in radish cultivars. *J. Amer. Soc. Hort. Sci.* 110: 634-638.
12. Carter, C. D. and J. C. Snyder. 1986. Mite responses and trichome characters in a full-sib F2 of **Lyconersicon** **esculentum** x **L. hirsutum**. *J. Amer. Soc. Hort. Sci.* 111: 130-133.

13. Carter, C. D. and J. C. Snyder. 1985. Mite responses in relation to trichomes of Lyconersicon esculentum x L. hirsutum F₂ hybrids. *Euphytica* 34: 177-185.
14. **Coltman**, R. R., G. C. Gerloff, and W. H. Gabelman. 1986. Equivalent stress comparisons among tomato strains differentially tolerant to phosphorus deficiency. *J. Amer. Soc. Hort. Sci.* 111: 4212-426.
15. Compton, W. A. and P. T. Nordquist. 1986. Registration of four parental inbred lines of maize. *Crop Sci.* 26: 393.
16. Day, A. D., R. K. Thompson, and M. J. **Ottman**. 1986. Registration of Arizona arid environment maize germplasm. *Crop Sci.* 26: 390-391.
17. **Elango**, D., J. Robb, G. Newcombe, and L. V. Busch. 1986. Growth pouch technique for the observation of cellular interactions between alfalfa seedling roots and Verticillium albo-atrum. *Canadian Journal of Plant Pathology* 8: 78-84.
18. **Ellison**, J. H. and J. J. Kinelski. 1986. 'Greenwich', a male asparagus hybrid. *HortScience* 21: 1249.
19. Gepts, P. and F. A. Bliss. 1985. Differential geographic origin of F₁ hybrid weakness inducing genes suggesting two gene pools in common bean. *J. Hered.* 76: 447-450.
20. Glenn, M. G., F. S. Chew, and P. H. Williams. 1985. Hyphal penetration of Brassica (cruciferae) roots by a vesicular-arbuscular fungus. *New Phytol.* 99: 463-472.
21. Goodman, M. M. 1985. Exotic maize germplasm: status, prospects and remedies. *Ia. State J. Res.* 59(4): 497-528.
22. Greub, L. J., P. N. Drolsom, and D. A. Rohweder. 1985. Salt tolerance of grasses and legumes for roadside use. *Agron. J.* 77: 76-80.
23. Gulya, T. J. and J. F. Miller. 1985. Registration of downy mildew race 3 resistant sunflower germplasm composite DM-1. *Crop Sci.* 25: 719.
24. Hainzelin, E. M., and J. L. Marchand. 1986. Registration of **IRAT-297** maize Zea mays germplasm. *Crop Sci.* 26(5): 1090-1091.
25. Hallauer, A. R. 1986. Registration of BS-26 maize, Zea mays, germplasm. *Crop Sci.* 26(4): 838-839.
26. Hallauer, A. R., W. A. Russell. 1986. Registration of BS-18 maize, Zea mays, germplasm. *Crop Sci.* 26: 838.
27. Hanover, J. W. and P. Schaefer. 1985. A morphological comparison of blue and Engelmann spruces in the Scotch Creek Drainage, Colorado. *Silvae Genetica* 34: 105-110.
28. Heller, W. E. and C. Gessler. 1986. Induced systemic resistance in tomato plants against Phytophthora infestans. *J. Phytopathology* 116: 323-328.
29. Henderson, W. R. 1986. 'Wolfpack 1' and 'Wolfpack 2' tomato. *HortScience* 21: 1247-1248.

30. Herman, D. E. 1985. Shrubs for northern plains landscapes. Amer. Nurseryman **161(12)**: 62-69,
31. Honma, Shigemi and H. H. Murakishi. 1986. MI-2000, MI-100, and MI-08 tomato breeding populations. Hort Sci. 231: 1244-1245.
32. Huang, H. C., K. W. Richards, and E. G. Kokko. 1986. Role of the leafcutter bee in dissemination of Verticillium albo-atrum. Phytopathology. 76: 75-79.
33. Iezzoni, A. F. and R. L. Hamilton. 1985. Differences in spring floral bud development among sour cherry cultivars. HortScience 20: 915-916.
34. Jones, R. A. 1986. High salt tolerance potential in Lycoopersicon species during germination. Euphytica 35: 575-582.
35. Jones, J. B. and J. W. Scott. 1986. Hypersensitive response in tomato to Xanthomonas comoestris pr. vesicatoria. Plant Disease 70: 337-339.
36. Karow, R. S., and R. A. Forsberg. 1985. Selection for linoleic acid concentration among progeny of a high x low linoleic acid oat cross. Crop Sci. 25: 45-47.
37. Kean, D. and J. R. 'Baggett. 1986. The inheritance of parthenocarpy in Oregon T5-4 tomato. J. Amer. Soc. Hort.Sci. 111: 596-599.
38. Kehr, W. R., D. K. Barnes, F. I. Frosheiser, G. R. Manglitz, and R. L. Ogden. 1986. Registration of 'Wrangler' Alfalfa. Crop Sci. **26:646**.
39. Leath, S. and W. L. Pedersen. 1986. Comparison of near-isogenic maize lines with and without the Htl gene for resistance to four foliar pathogens. Phytopathology 76: 108-111.
40. Leath, S. and W. L. Pedersen. 1986. Differences in resistance between maize hybrids with or without the Htl gene when infected with Exserohilum turcicum race 2. Phytopathology 76: 257-260.
41. **Leeper**, P. W. and E. L. Cox. 1986. 'Freshmarket 9' tomato. HortScience 21: 156.
42. **Leeper**, P. W. and E. L. Cox. 1986. 'Processor 40' tomato. HortScience 21: 159-160.
43. Lipps, P. E. and L. Herr. 1986. Reactions of Helianthus annuus and H. tuberosus plant introductions to Alternaria helianthi. Plant Disease 70: 835-839.
44. Luedders, V. D. 1985. Selection and inbreeding of Heterodera plicines on Glycine max. J. of Nematology 17: 400-404.
45. Martin, M. W. and P. E. Thomas. 1986. Increased value of resistance to infection if used in integrated pest management control of tomato curly top. Phytopathology 76: 540-542.
46. Martin, M. W. and P. E. Thomas. 1986. Levels, dependability, and usefulness of resistance to Tomato Curly Top disease. Plant Disease 70: **136:141**.

47. **Michaels**, T. E. and R. H. Andrew. 1986. Sugar accumulation in shrunken 2 maize kernels. Crop Sci. 26: 104-107.
48. Miller, D. A. 1986. Registration of IL-83-2 alfalfa Medicago sativa, germplasm. Crop Sci. 26: 837.
49. Miller, J. F. 1986. Registration of three nonoilseed sunflower midge tolerant bulk populations and three midge tolerant germplasm lines. 1986. Crop Sci 26: 1091-1092.
50. Miller, J. F. 1986. Registration of five nonoilseed sunflower restorer germplasm lines. Crop Sci. 26: 1265.
51. Miller, J. F. 1986. Registration of six verticillium wilt resistant nonoilseed restorer sunflower germplasm lines., Crop Sci. 26: 1265-1266.
52. Miller, J. F. 1986. Registration of three nonoilseed sunflower germplasm populations and five nonoilseed sunflower germplasm bulk populations. Crop Sci. 16: 1266.
53. Miller, J. F. 1986. Registration of five nonoilseed sunflower female germplasm lines. Crop Sci. **f26(6)**: 1264.
54. Miller, J. F. and T. J. Gulya. 1985. Registration of DM-2 and DM-3 sunflower germplasm. Crop Sci. 25: 718-719.
55. Miller, J. F., J. J. Hammond, T. J. Gulya, and G. D. Statler. 1986. Registration of '**Linton**' Flax. Crop Sci. 26: 385.
56. Norton, D. C. and J. Edwards. 1985. Nematode populations in maize and related species. Maydica 30: 67-74.
57. O'Connell, M. A. and M. R. Hanson. 1985. Somatic Hybridization between Lyconersicon esculentum and Lycopersicon pennellii. **Theor.** Appl. Genet. 70: 1-12.
58. Parrot, W. A. and R. R. Smith. 1985. Bilateral sexual tetraploidization in red clover. N. Can. J. Genet. Cytol. 27: 64-68.
59. Pataky, J. K., J. M. Perkins, and S. Leath. 1986. Effects of qualitative and quantitative resistance on the development and spread of northern leaf blight of maize caused by Exserohilum turcicum Races 1 and 2. Phytopathology 76: 1349-1352.
60. Pedersen, W. L., J. M. Perkins, J. A. Radtke, and R. J. Miller. 1986. Field Evaluation of corn inbreds and selections for resistance to Exserohilum turcicum Race 2. Plant Disease 70: 376-377.
61. Pellett, H. and J. J. Luby. 1985. The University of Minnesota introduces 10 new plants. American Nurseryman 167: 90-92.
62. Pellett, H. and S. Moe, and K. Vogel. 1985. Cold tolerance of shade tree species and cultivars in the upper **midwest**. J. Environ. Hort. 3: 58-62.
63. Pellett, H., S. Moe, K. Vogel, and L. Mainquist. 1985. Development of Lonicera resistant to the honeysuckle aphid. (Hvadanhis tataracae). J. Environ. Hort. 3: 79-81.

64. Peterson, C. E., J. E. Staub, L. Crubaugh, and M. Palmer. 1986. Wisconsin 5207G cucumber breeding population. HortSci. 21: 335-6.
65. Peterson, C. E., J. E. Staub, and M. J. Palmer. 1986. 'Wautoma' cucumber. HortSci 21: 326.
66. Peterson, C. E., J. E. Staub, P. H. Williams, and M. J. Palmer. 1986. Wisconsin 1983 Cucumber. HortScience 21: 1082-1083.
67. Rick, C. M. 1986. A Love Affair with the Love Apple. Science of Food and Agriculture (Published by CAST) 4: 2-9.
68. Rick, C. M. 1986. Available tomato species accessions in the Tomato Genetics Stock Center. TGC Report 36: 38-56.
69. Rick, C. M. 1986. Germplasm resources in the wild tomato species. Actae **Horticulturae** 190: 39-47.
70. Roberts, P. A. and J. Thomson. 1986. Variability in reproduction of isolates of Moloidogyne incognita and M. javanica on resistant tomato genotypes. Plant Disease 70: 547-551.
71. Romero **Andreas**, J. and F. A. Bliss. 1985. Heritable variation in the phaseolin protein of nondomesticated common bean. **Theor.** Appl. Genet. 71: 478-480.
72. Sammataro, D., E. H. Erickson, Jr., and M. B. Garment. 1985. Ultrastructure of the Sunflower Nectary. J. Apicult. Res. 24: 150-160.
73. **Schaffer**, A. A., H. S. Pairs, and I. M. Ascarelli. 1986. Carotenoid and **strch** content of near-isogenic **B⁺B⁺** and BB genotypes of Cucurbita. J. Amer.. **Soc.** Hort. Sci. 111: 780-783.
74. Scott, J. W. and J. B. Jones. 1986. Sources of resistance to bacterial spot in tomato. HortScience. 21: 304-306.
75. Seiler, G. J. 1985. Evaluation of seed of sunflower species for several chemical and morphological characteristics. Crop Sci. **25(1)**: 183-186.
76. Shoemaker, R. C., P. M. Hatfield, R. G. Palmer, and A. G. Atherly. 1986. Chloroplast DNA variation in the genus Glycine subgenus Soja. J. Heredity 77: 26-30.
77. Simons, M. D. 1985. Transfer of field resistance to Puccinia coronata from Avena sterilis to cultivated oats by backcrossing. Phytopathology 75: 314-317.
78. Simons, M. D., L. D. Robertson, and K. J. Frey. 1985. Association of host cytoplasm with reaction to Puccinia coronata in progeny of crosses between wild and cultivated oats. Plant Disease 69: 969-971.
79. Smith, **G. A.** and E. G. Ruppel. 1986. Registration of tetraploid Cercospora resistant sugarbeet germplasms. Crop Sci. 26: 392.

80. Snyder, J. C. and C. D. Carter. 1984. Leaf **tichomes** and resistance of Lvcouersicon hirsutum and L. esculentum to spider mites. J.A.S.H.S. 109: 837-843.
81. Snyder, J. C. and C. D. Carter. 1985. Trichomes on leaves of Lvconersicon hirsutum, L. esculentum and their hybrids. Euphytica 34: 53-64.
82. Sorenson, E. L., E. K. Horber, D. L. Stuteville. 1986. Registration of **KS94GH6** glandular-haired alfalfa germplasm with multiple pest resistance. Crop Sci. 26: 1088.
83. Takeda, K. and K. J. Frey. 1985. Simultaneous selection for grain yield and protein percentage in backcross populations from Avena sterilis x A. sativa matings by using the independent culling levels procedure. **Theor.** Appl. Genet. 69: 375-382.
84. Tanksley, S. D. and F. Loaiza-Figueroa. 1985. Gametophytic self-incompatibility is controlled by a single major locus on chromosome 1 in Lvcooersicon peruvianum. **Proc. Natl. Acad. Sci.** 82: 5093-5096.
85. **VanSteekelenburg**, N. A. M. 1985. Resistance to Corvnebacterium michiganense in tomato genotypes. Euphytica 34: 245-250.
86. Wolf, s., D. Yakir, M. A. Stevens, and J. Rudich. 1986. Cold temperature tolerance of wild tomato speies. J. Amer. **Soc. HortSci.** 111: 960-964.
87. Yassin, T. E. 1985. Inheritance of resistance to leaf curl virus disease in a cross between tomato (Lvcopersicon esculentum Mill.) and currant tomato (L. pimpinellifolium (Jusl.) Mill.). J. Agric. Sci., Camb. 105: 659-661.
88. Zeiders, K. E., R. T. Sherwood, and C. C. Berg. 1986. Reactions of smooth Bromegrass accessions to brown leaf spot caused by Pvrenophora bromi. Plant Disease 70: 324-326.

VII. APPROVALS

March 16, 1987
Date

Amy Iezzoni
Chairman, NC-7 Technical Comm.
Amy Iezzoni

March 10, 1987
Date

Roger L. Mitchell
NC-7 Administrative Adviser
R. L. Mitchell