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, 1956

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:

State Experiment Stations	Representatives
Iowa	*C. P. Wilsie, Chairman
Alaska	*R. L. Taylor
Illinois	*E. B. Patterson
Indiana	*K. J. Lessman
Kansas	*C. E. Wassom
Michigan	*C. M. Harrison
Minnesota	*L. C. Snyder
Missouri	*A. D. Hibbard
Nebraska	*J. H. Williams
North Dakota	*G. A. Peterson, Secretary
Ohio	*F. S. Howlett
South Dakota	*R. M. Peterson
Wisconsin	*W. H. Gabelman
Administrative Adviser	E. F. Frolik

U. S. Department of Agriculture

New Crops Research Branch	*J. L. Creech, Chief
Ass't Chief, New Crops Research Branch	Q. Jones
Plant Introduction Investigations	H. L. Hyland
Chemurgic Crop Investigations	G. A. White
Cooperative State Research Service	
Soil Conservation Service	*D. S. Douglas
	M. D. Atkins
Northern Utilization Research & Development Division	*I. A. Wolff
U. S. Forest Service	*D. H. Dawson

North Central Regional Plant Introduction Station, Ames, Iowa

Regional Coordinator	W. H. Skrdla
Horticulturist	A. F. Dodge
Plant Pathologist	R. L. Clark
Entomologist	J. L. Jarvis
Technician	Herbert Spencer
Technician	Delbert Lutjen
Technician	Janet Colt
Secretary	Sharon Egeland
Stenographer	Marcia Berrett

* Voting members of NC-7 Regional Technical Committee.

3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

a. Introductions Having Special Value. On the basis of records kept on evaluation reports, it becomes evident that certain introductions have real merit due to disease or insect resistance, various plant characteristics or for other reasons. Such an introduction is considered, at this station, as one for which its merit or value, over a period of years, is sufficiently substantiated. This includes their use in breeding lines, varieties, genetic "tools", or otherwise accepted by crops workers for the merit they contain. Individual reports received for 1966 only, are provided in Appendix C.

Listed below are introductions considered to have special value:

(1) Chrysanthemum (hybrid) introduced from Japan in 1956 as PI 231097. Origin: Takii & Co. Ltd., Kyoto, Japan, variety 'Kinbyobu'. This variety was released with its original Japanese name, 'Kinbyobu', by the Montana Agricultural Experiment Station in cooperation with the Crops Research Division, USDA-ARS in 1965. ~~It was also released by the University of Minnesota as the variety, 'Superior'.~~

According to the Montana release, it is a very hardy, moderately early blooming, fully double yellow type of garden chrysanthemum. It is vigorous, healthy, bushy, and plants have survived five winters without protection at Bozeman, Montana. Produces stolons abundently, and is quite frost-resistant in both leaves and buds. Reaches full bloom at Bozeman, Montana during the latter half of September. Color: Canary yellow 2 to Empire yellow 603-603/3 (RHS). Not well suited for spring pot plant use since the plants rosette unless vernalized at low temperature.

~~The Minnesota description was not at hand at the time of writing this report.~~

(2) Allium cepa, 249903 from Spain, variety 'Cebolla de Grano'. An indigenous sweet, reddish onion maturing and harvested in August. Keeps through the winter.

Reports from several sources indicate that this line has shown resistance to both mildew and pink root, although plants in the accession segregate for these factors. It is one of only a few lines that shows resistance to both diseases. One source is testing it for possible use as a variety.

(3) Cucumis sativus

(a) 200818 - collected at a bazaar at Maymo, Burma in 1952.

This line is perhaps best known for its resistance to bacterial wilt, as reported by several sources. Its resistance to this disease was published in several publications and it is being used in breeding programs for this factor.

It has also been reported to segregate for resistance to powdery mildew and mosaic.

(b) 220860 - variety 'Shogoin' from Korea. This line is best known for its gynoecious or all female flower character and this has been successfully used in developing the first commercial hybrid

that carries this character. Hybrids developed at Michigan State University that are partly derived from this introduction are 'Spartan Dawn', 'Spartan Champion', 'Spartan Reserve' (all pickling types) and the market type, 'Spartangreen'. The accession also contributed germplasm to the Michigan inbred line MSU 713-5 released in 1961.

(4.) Lycopersicon

(a) Resistance to 2,4-D. In 1966, Dr. Dermot Coyne and associates at Nebraska screened a part of the tomato collection for resistance to 2,4-D. The following report was received:

"Four hundred forty eight plant introductions were evaluated for resistance to 2,4-D spray injury in an observation trial at Lincoln, Nebraska in 1966. The 2,4-D diethyl amine formulation was used and sprayed on the plants at the rate of nine ounces actual 2,4-D per acre. Most of the lines showed severe and/or very severe plant injury six days after spraying and 394 lines died at a later time. The accessions listed below showed early moderate injury but new vigorous growth free from 2,4-D symptoms developed on almost all of the plants in the following six PI lines:

118778	Brazil	Lycopersicon	esculentum
124036	Argentina	"	"
129131	Panama	"	"
190858	Argentina	"	"
272636	Costa Rica	"	"
203229	Australia	"	"

Fruit set was heavy on these lines but maturity was delayed. PI 129131 may be a useful parent to use in a breeding program for a source of resistance to 2,4-D injury."

(b) 79532 - L. pimpinellifolium from Peru. This line is very well known for its disease resistance factor and it has contributed to many varieties previously reported. More recently, it contributed to the variety 'Manapal', a disease-resistant tomato with the desirable qualities of Rutgers. The pedigree of 'Manapal' includes both Manalucie and Indian River cultivars which were developed in part from PI 79532 and 126445.

PI 79532 contributed Stemphyllium leaf spot resistance to the variety,'Marion' released by South Carolina.

It was used as a parent in developing the variety 'Epoch' at Purdue to which it contributed Fusarium wilt resistance.

It contributed to the varieties 'Floralau', 'Porte', Golden Sphere','Avalanche' and 'Immokalee'.

From Hungary, information was received that it is resistant to Cladosporium fulvum.

(c) 126445 - L. hirsutum from Peru. Aside from being used in certain varieties with 79532, as stated above, it has shown resistance to leafminer, a potent strain (#11) of the curly top virus and is self fertile as well.

lt, as well as 79532, was reported resistant to Cladosporium fulvum in Hungary. Also, it was reported to be resistant to Septoria leafspot in greenhouse tests.

(d) 126915 - L. esculentum x L. pimpinellifolium from Peru. In Florida, it had adequate resistance to Fusarium Oxysporum f. lycopersici for inclusion in a breeding program. Its resistance to several races of the disease, as well as the fact that resistance was controlled by a single dominant gene was confirmed by both the Florida and Ohio stations. The Ohio Station designated the gene for race 2 resistance as 12. The accession was also reported to have leaf mold resistance.

(e) 128657 - L. peruvianum from Peru. This accession is best known for its resistance to root knot nematode, Meloidogyne incognita var. acrita. Thomason and Smith in 1957 reported that ".... so far as is known, all resistant (nematode) tomato stocks now in use derive their resistance from a cross, L. esculentum (Michigan State Forcing) x L. peruvianum (PI 128657) made in 1943".

It was used as the source of nematode resistance in the variety 'Nemared'.

It was also reported by Cannon in 1960 (Utah) that PI 128657 is resistant to curly top in the field at Hurricane and Logan, Utah.

(f) 223306 - Lycopersicon esculentum from Rhode Island. The value of this line is in its resistance to cracking, as reported from several sources. In Canada, it was released as a tomato breeding line by the Horticultural Research Institute of Ontario as Line 6727 M 67-2. Parentage: H 4 Line x [(Longred x Pritchard) x 233306] sp+U+hp. Midseason size 2.6, vit. C 54, smooth, fairly firm.

(5) Pisum sativum, PI 166159 from India. This line is known for its resistance to root rots, Fusarium solani f. pisi and aphanomyces eutiches, especially the latter. It is being used in breeding lines for this purpose. It was also reported to be resistant to alfalfa mosaic virus.

(6) Helianthus

(a) 201815 H. macrophyllus x H. tuberosus from Sweden. - Commonly known as "Sunchoke" - a sterile hybrid that blooms, does not seed, but produces an abundance of tubers. The tubers are edible and can be used for the same purposes as tubers of H. tuberosus. Flowers are of ornamental value and hold up well in a container for nearly a week. It is a perennial, tubers survive the winter in the ground at Ames most of the time and it grows fast to form a quick plant screen in home yards.

(b) 265100 H. annuus from USSR, var. 'Jdanovsky 82.81'. In Minnesota, it yielded 2210 lbs. seed per acre which contained 40.3% oil, compared with 1637 lbs. per acre and 31.5% oil for the average of 4 check varieties.

While its high oil content is of interest, it was also reported as having some rust resistance.

(7) Medicago

(a) 205329 M. sativa from Peru. This line is of interest for its leafhopper resistance, as reported by several sources, although resistance is segregating. It contributed about 5% of the germplasm in the variety 'WL 304'. 'WL 304' is a 10 clone synthetic comprised of one selection out of an open pollinated progeny from PI 205329. In the North Central Region it produced higher yields than Vernal, Buffalo or Ranger in certain locations in 1960-63.

(b) 231731 M. falcata from Wisconsin (Wisc. 460). This is a vigorous line, hardy, has considerable disease resistance, produces good forage yields, but low seed yields. Various sources reported its resistance to Cercospora, rust and various foliar diseases. It has resistance to leafhopper and was reported to be among the lines having the least injury from alfalfa weevil feeding in an alfalfa introduction nursery.

(c) 239953 M. sativa var. gaetula from Algeria. This is the line originally reported by Dudley, North Carolina, as showing resistance to alfalfa weevil. It was also reported by Tennessee as having the least weevil feeding injury in the alfalfa introduction nursery. It contributed weevil resistance to breeding line North Carolina W(64) 1 released by the Crops Research Division and North Carolina Agricultural Experiment Station in 1964.

(d) 262532 M. falcata from USSR. This accession was reported by several sources to be resistant to leafhopper. This was also noted in plantings at the Regional Station. In addition, it was reported to be resistant to pea aphids and rust. Tennessee and North Carolina reported that it is showing resistance to alfalfa weevil in initial tests.

(8) Zea Mays

(a) 163558 - a purple-yellow-white flint from Guatemala. Reported by several sources to carry resistance to Puccinia sorghi. Hooker reported that it carries dominant protoplasmic resistance to this disease.

It was also reported as having resistance to Giberella stalk rot, rust and Diplodia zeae. It has good roots, strong stalks and resists lodging.

b. Regional Station Program

(1) Physical facilities

(a) The largest item concerning improvements to physical facilities during the past year is the nearly complete remodeling of the headhouse to create new office and laboratory space and to make more efficient use of existing space. The glass roof over the corridor between the headhouse and the greenhouses was replaced with a shingled roof to render that area dry and usable for office type work. Additional lighting and ventilation were added. The north end was divided off to create a new work area. In the main building, two large rooms were subdivided to create new office and laboratory space for the Pathologist and Entomologist. Cabinet and cupboard space as well as table tops for work areas were included. The lighting and heating were upgraded and all walls were painted. This is the first improvement to the interior of the building since it was built in 1948. The entomology laboratory and soil potting space are yet to be completed but plans for this work are now being drawn up. There will be no exterior addition to the

headhouse or greenhouses. It is only a rearrangement of space originally available.

(2) Staff Personnel. In 1966 the Entomology Research Division placed an entomologist at this station to screen plant introductions in search of natural resistance to insect pests. He reported for duty in early October and has already started some work.

(3) Production. The 1966 growing season is the nineteenth since the establishment of the Regional Station at Ames on December 1, 1947. Following a relatively warm, dry winter (only eight inches of snow) the spring was long, cold and wet. This was followed by extremely high temperatures and dry weather in June and July and then a cool, dry August. About 15 inches of rain was received through mid-June while only about three inches fell between then and mid-October. Reports for central Iowa indicate that the fall of 1966 was the driest in 76 years.

However, crops were generally good and cucumbers remained green longer than usual.

The 1966 seed increases will result in an increase of about 670 items for the 1967 seed list, a comparison with the 1966 list is shown below:

Inventory of Available Crop Accessions

1965	1966	Increase
12,014	12,684	670

Table I. Number of Genera and Accessions of Various Crops Grown at the Regional Station in 1966.

	No. of Genera		No. of Accessions	
Crop	1965	1966	1965	1966
Grasses	27	22	536	383
Legumes	14	12	264	239
Vegetables	12	9	1214	820
Ornamentals	43	61	41	137
Special Crops	38	35	272	255
TOTAL	134	139	2347	1834
Carryover of perennial accessions			18	250
TOTAL FOR SEASON			2365	2084

Special Purpose Plantings

Corn borer evaluation	357	
Corn disease evaluation	357	
(4 replications of each accession)		1428 Plots
Tomato disease evaluation	100	
(4 replications of each accession)	___	400 Plots
TOTAL, ALL PLANTINGS	2898	1828 Plots

(4) Introductions Received. Listed below in Table II is a summary of crops received in 1966 compared with 1965:

Table II. Number of Genera and Accessions of the Various Crop Groups Received in 1965 and 1966. (See Appendix B).

Crop	No. of Genera 1965	No. of Genera 1966	No. of Accessions 1965	No. of Accessions 1966
Grasses	9	21	44	400
Legumes	6	17	53	424
Vegetables	11	6	250	51
Oil & Special	17	25	78	80
Ornamentals	26	35	56	65
TOTALS	69	104	481	1020

(5) Seed and Plants Distributed.

Table III. Number of Seed Packets and Plants Distributed in 1965 and 1966 According to Crop Group. (See Appendix B. for further details).

Crop	No. of Packets or Plants 1965	1966
Grasses	2212	2807
Legumes	1429	354
Vegetables	6330	3862
Oil & Special	188	559
TOTAL PACKETS	10,159	7582
Ornamentals (Plants)	996	1662
TOTAL	11,155	9244
Rooted cuttings of 'Cheyenne' privet		750
TOTAL, ALL ITEMS		9994

(6) Total Seed and Plant Inventory for 1966. An inventory of accessions on hand in 1966 appears in Appendix B. A summary of that inventory appears in Table IV below:

Table IV. Summary of Appendix B.

Crop	Total Active 1/1/66 Genera	Total Active 1/1/66 Accessions	Removed From Inventory 1966	Rec'd. 1966	Total Active 12/31/66	Seed List 1967	To Be Increased	Pkts. Plants Distributed
Grasses	47	4117	36	400	4481	4054	427	2807
Legumes	20	1922	6	424	2340	1850	490	354
Vegetables	22	6839	167	51	6723	5886	837	3862
Oil & Special	58	867	0	80	947	894	53	559
TOTALS	147	13745	209	955	14491	12684	1807	7582
*Ornamentals	89	238	8	65	295	-	-	1662
TOTALS	236	13983	217	1020	14786	12684	1807	9244
'Cheyenne' privet, PI 107630, rooted cuttings								750
TOTAL DISTRIBUTION								9994

*(See next page for footnote).

*(Footnote to Table IV).

Woody and herbaceous ornamentals do not appear in the published seed list. Special lists of available stock is circulated at appropriate times to interested cooperators and orders are filled from their requests.

(7) Seed Transfers to the National Seed Storage Laboratory. Transfers of reserve quantities of seed of valuable introductions are being made to the National Seed Storage Laboratory. The following were sent in 1966:

Corn	17 accessions
Tomatoes	250 accessions
TOTAL	267

Additional seed will be transferred in 1967.

(8) Plant Pathology Program.

(a) Disease Screening

1 Three hundred and ten accessions of corn were screened for Diplodia stalk rot resistance in an inoculated, replicated field test. Only PI 162701 appeared to be highly resistant and it will be checked again in 1967 before a final rating is assigned to it. Sixteen other accessions (167950, 167955, 167963, 167977, 167992, 168042, 168043, 171923, 172330, 172335, 175972, 176806, 177110, 177587, 177601, and 179130) showed some resistance, at least equal to that of the check line AES 704.

2 One hundred and eighty tomato accessions were screened for resistance to soil rot of the fruits (Rhizoctonia solani). Six accessions (91458, 92356, 95584, 108246, 110597, and 120266) showed resistance at least equal to that of Rutgers.

3 Alfalfa accessions are being screened for resistance to Pseudoplea leafspot in the greenhouse. Of 22 accessions tested so far, 170446 had the highest level of resistance. Individual plants of other accessions also showed resistance and are currently being reinoculated. Ranger and Buffalo are being used as checks.

4 Ninety-nine accessions of the total carrot collection have been screened for resistance to root knot nematode. Only one (174206) was as resistant as Early Chantenay. Work is continuing with the remainder of the carrot collection.

(b) Seed borne viruses in Cucurbita. Thirty-seven accessions of Cucurbita that were virus infected in the field were checked for seed transmission of virus in the greenhouse. Only three (177374, 179273, and 222247) transmitted virus through the seeds. Two others (167136 and 169421) are being checked again because of abnormal seedlings.

(c) General Pathology Observations in the Plots. No unusual diseases were noted. The sunflowers were again rogued to eliminate downy mildew-infected plants. Smut was more prevalent than normal in the corn.

(d) The "Summary of Reports" list was prepared and distributed for Pisum. The NE-9 pathologist was the primary author.

(9) Entomology Program

(a) Literature on insect resistance published beginning in 1950 through 1966 has been reviewed and indexed. Literature published prior to 1950 is indexed in R. H. Painter's book, "Insect Resistance in Crop Plants".

(b) A total of 389 references, mostly American and Canadian, have been indexed. Broken down by crops, they are as follows: alfalfa 57, apples 1, barley 9, beans 17, beets 1, birdsfoot trefoil 1, buckwheat 1, castorbeans 2, citrus 1, clovers 3, crucifers 13, corn 102, cotton 32, curcubits 8, grass 1, lettuce 1, oats 2, onions 4, ornamentals 2, peaches 1, peas 9, pine trees 7, potatoes 14, rice 1, sorghum 16, sweetclover 8, tobacco 3, tomatoes 5, and wheat 68.

(c) Rearing insects in the laboratory is an essential part of any resistance program. Therefore the literature on laboratory rearing of mites and insects has been reviewed and indexed. Broken down by orders, these references are as follows: Acarina 14, Coleoptera 32, Diptera 56, Hemiptera 8, Homoptera 11, Hymenoptera 2, Isoptera 2, Lepidoptera 59, Odonata 2, Orthoptora 14, Psocoptera 1, Thysanoptera 1, and Tricoptera 1.

(d) Peppers are to be evaluated for resistance to the European corn borer. This work is presently underway in the greenhouse. At the time of writing, the plants are just coming into flower. The fruits when mature, will be artificially infested with borers.

(10) Ornamental Evaluation Program

(a) Trial Plant Distribution. From the Nebraska station domestic exploration for ornamentals, plants of eight items were available for North Central Regional trial planting this year. Included were seedlings of PI 303169 Amelanchier alnifolia, Colorado; two lots of Chamaebatiaria millifolium--one from Arizona and one from Utah; PI 303235 Clematis orientalis, Colorado; PI 299429 Dianthus deltoides, Colorado; plants from PI 303284 Dianthus caryophyllus, Buffalo, Wyoming; and Philadelphus microphylla obtained in Arizona. The North Platte Experiment Station also furnished seedling Euonymus bungeana plants. These are derived from PI 62418, a November 1, 1924 plant introduction secured by P. H. Dorsett in Peking, China, and long growing in Nebraska. Plants of Platanus wrightii obtained from Prof. Viehmeyer, Nebraska Experiment Station, were distributed to three cooperators in the North Central Region and through the assistance of Dr. W. R. Langford, Coordinator of the S-9 Regional Station, to five cooperators in the Southern Region.

Other plants which were given widespread regional trial in 1966 include two herbaceous perennials, Lythrum 'Columbia', Rudbeckia 'Autumn Sun'; five deciduous shrubs, namely: PI 262244 Buddlea crispa 'Farreri', Forsythia viridissima bronxensis, Shepherdia argentia, Spiraea x Arguta 'Grefsheim', and Spiraea nipponica tosaensis 'Snow Mound'; three flowering crabapples - PI 54083 Malus baccata jackii and two Canadian selections: Malus 'Pink Spires' and Malus 'Royalty'. These last two are rosy bloom ornamental crabs being marketed in 1967.

Total number of trial plants distributed in 1966 from the Regional Station in Ames was 1662. Of these 830 were donated by commercial nurseries; 466 by the Nebraska Agricultural Experiment Station, North Platte, and 366 were grown at the Regional Station.

(b.) Trial Plant Reports. Cooperators were supplied with appropriately prepared annual report forms and asked to report 1966 performance for plants sent out in 1964, 1965, and 1966. A final, or ten-year report, was requested on plants in trial since the spring of 1957. More than half of these reports had been completed and returned to the Regional Station by the end of the calender year.

The survival reports for some little used plants included among those planted in 1966 were not too favorable. Whether or not this will prove to be a continuing problem remains to be seen as new plantings are made.

Regional trial cooperator five-year reports for five deciduous shrubs were summarized, duplicated and distributed to cooperators during the year.

(c) New Accessions. PI 276114 Lonicera caerulea from the 1961 Longwood-U.S.D.A. Ornamental Plant Exploration at Mt. Apoi Hidaka, Hokkaido, Japan - 33 seedlings remain from 70 received from U. S. Plant Introduction Station, Glenn Dale, Maryland October 1962. Included among these are apparently valuable dwarf plants. If these superior plants survive the current dormant season they should be propagated and placed in regional trial. Reports for Central Iowa indicate that the Fall of 1966 was the driest in 76 years.

Working with twelve accessions of shrubs and trees from the Nebraska explorations more than 900 plants were planted last spring at the Regional Station for further observation and selection.

c. Regional Cooperative Program. Part b of this report concerns the activities at the Regional Station. Part c will concern regional cooperative activities.

(1) Domestic Exploration. Through assistance from the New Crops Research Branch, domestic exploration for plants in the North Central Region may be conducted through one of the following federal line projects:

CRi 1-11 Introduction of Fruits and Vegetable Crops
CRi 1-12 Introduction of Field Crops
CRi 1-13 Introduction of Specialty Crops

Nebraska's three year domestic exploration project was concluded on June 30, 1966, with the collection of about 90 items for the year in the Southwestern states. Many items collected in previous years are in evaluation trials and some appear to be quite promising. Two items are scheduled for release to the nursery trade. This station is assisting the Nebraska station with propagation of items for evaluation in the NC-7 regional trials. Also, seed and plant material has been received for storage and preservation. It is hoped that the Nebraska Station will publish on this work.

On July 1, the Alaska station has begun a three year program of collecting native forage species in Alaska. Assistance is being provided by the New Crops Research Branch. An exploration was made during the latter part of the Alaskan summer of 1966.

(2) Evaluations of New Crops for Potential Industrial Utilization.

(a) In 1966, 18 new crop species were planted for the first time at the Regional Station. They are:

1 Stenachaenium macrocephalum
2 Tephrosia vogelii
3 Sinapis alba
4 Iberis amara
5 Iberis umbellata
6 Sigesbeckia glabrescens
7 Madia sativa
8 Crepis Kotschyana
9 Lobularia maritima
10 Helenium microcephalum
11 Echinacea angustifolia
12 Schlechtendalia luzulaefolia
13 Solanum capsicastrum
14 Solanum Khasianum
15 Solanum macrodon
16 Solanum nigrum
17 Solanum verbascifolium
18 Crambe tatarica

Due to the very heavy rainfall encountered after planting, and extremely wet soil conditions, many species did not emerge at all. Also, some that did emerge, could not stand the extreme heat in June and July. Therefore, evaluation results were disappointing.

(b) Crambe abyssinca remains to be of much interest in the region. It has produced high yields in Indiana, both in central and southern portions. During the past two years, there has been increasing interest in Crambe hispanica. It is much like C. abyssinica except that it is about two weeks or more earlier in maturity.

(c) Vernonia. Indiana has made considerable progress in selecting and breeding desirable types of Vernonia anthelmintica.

(d) Tephrosia. A test was made with an alfalfa leaf stripper (developed at Iowa State University) to defoliate plants in a Tephrosia planting. The leaves contain the highest amount of a rotenone producing compound and it would seem logical to find ways of just harvesting leaves without taking the stems, too. The test was inconclusive, as the planting was not large enough. However, it appears that some modification of the stripper would be desirable, as well as stripping leaves at various stages of plant development.

(e) Kenaf. In cooperation with the Agricultural Engineering Department, Iowa State University, trials were made with various balers in an attempt to find some means of successfully baling kenaf. This is in the interest of finding a practical way of getting the kenaf stalks from the field to a processing plant. While the trials can be considered as being inconclusive at this time, they did point up some ideas that could be used in future trials.

(3) Regional Cooperative Evaluation Program.

(a) Evaluation and Research. The Regional Station coordinates evaluation and research information from cooperators and disseminates it within the North Central Region as well as to the other three Regional Stations and cooperating federal agencies. The coordination of evaluation and research on plant introductions to (1) discover valuable characteristics in them and to (2) publicize the results to crops workers in the region is a continuing function of the NC-7 program.

Introductions which are reported to have special value or unusual characteristics are summarized in Appendix C. of this report. Preliminary as well as published results are reported.

(b) Federal Line Projects. Cooperative work is carried on with the New Crops Research Branch, USDA-ARS-CR, Soil Conservation Service, Northern Utilization Research and Development Division and Forest Service. Cooperative evaluation work with the New Crops Research Branch is conducted under the following line projects:

CRi 2-1 Evaluation and Maintenance of Fruit and Nut Introductions
CRi 2-5 Evaluation and Maintenance of Vegetable Introductions
CRi 2-7 Evaluation and Maintenance of Forage and Range Plant Introductions
CRi 2-8 Evaluation and Maintenance of Cereal Crop Introductions

d. Public Relations. The Regional Station was visited by about 160 people during 1965-66. They included representatives from private interests , state and federal representatives, foreign visitors and student classes. Organized groups that visited the station are listed as follows:

(1) Iowa Teachers Conservation Camp	80
(2) Agronomy Class	14
(3) Botany Class	16
(4) Soil Science Institute	35
(5) Others	15
	160

4. USEFULNESS OF FINDINGS:

Plant introductions continue to contribute valuable characteristics to breeding lines and varieties, as indicated above and in Appendix C, which is of ultimate value to the public and to the agricultural economy.

Results obtained through the NC-7 cooperative project are mutually useful to plant breeders and other research workers. The NC-7 project represents cooperation among State Experiment Stations in the region, the USDA (Including Crops Research Division, Soil Conservation Service, Forest Service and Northern Utilization Research and Development Division), private enterprise and the Regional Station. The evaluation of introductions and free exchange of information about them, as provided in this report and others, is beneficial to crops workers and ultimately to the public, through release of new and improved varieties. The permanent maintenance of plant introductions also assures a future source of supply of known valuable lines and genes and serves as a reservoir of diversified germplasm for screening whenever new characters are sought.

The regional evaluation work on promising industrial crops is contributing information on many species of plants, which is basic in the search for and development of new crops.

5. WORK PLANNED FOR NEXT YEAR:

Continue plant introduction program of seed increase, storage, preliminary evaluation, plant pathology and entomology work, local and regional testing of new crops and woody ornamentals, and coordination of regional cooperative program.

Work planned for next year includes, but is not limited to the following:

a. Continue cooperative work of domestic exploration for native grasses in Alaska.

b. Continue evaluation and seed increase of grass, legume, vegetable, ornamental and new crop introductions. Field planting of about 2500 introductions is planned.

c. Finish the evaluation of carrot introductions for resistance to nematodes. (Supplement I).

d. Field disease evaluations of tomato introductions (Supplement I and II).

e. Field disease and insect evaluation of corn introductions (Supplement I and II).

f. Field evaluation of cucumbers for insect resistance (Supplement II).

g. Develop an entomology laboratory and soil potting room in Plant Introduction headhouse and greenhouse.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

a. Regional Station. Informal as well as formal publications issued in 1966 are listed below:

(1) Mimeographs: 1966 seed list of available introductions, annual reports for NC-7 Technical Committee and the Cooperative State Research Service, including a summary of promising introductions.

(2) Dodge, A. F. 1966. Five Year Report on Regional Plantings of Woody Ornamentals and Shelter Plants in the North Central Region, 1959-1963. Loose Leaf Notebook, North Central Regional Plant Introduction Station, Ames, Iowa. 12 pp., six maps.

b. Iowa

(1) Hawk, Virgil B. and Frank Schaller. 1964. Emerald Crownvetch - A Pasture Legume. Iowa Farm Science 19:3-5.

(2) Mitchell, R. L. 1965. A Look at Some New Crops in Iowa. Iowa Farm Science 20 (2):3-4 August.

c. Kansas

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7. APPROVED:

January 25, 1967

C. P. Wilsie

Chairman, Technical Committee
C. P. Wilsie

January 25, 1967

E. F. Frolik

Regional Administrative Adviser
E. F. Frolik

APPENDIX A.

None for 1966.

APPENDIX B

Inventory and Summary of Accessions Maintained and Received through 1966.

Genera	Total Active Jan. 1 1966	Removed from Inventory 1966*	Rec'd. 1966	Total Active Dec. 31 1966	Seed List 1967	**To Be Increased	Pkts. Distributed
GRASSES & FIELD CROPS							
Aegilops	142	2	17	157	140	17	19
Agropyron	176	10	1	167	158	9	66
Agrostis	108	2	10	116	96	20	14
Alopecurus	34	2	6	38	32	6	8
Apera	6	0	0	6	5	1	1
Arrhenatherum	11	0	3	14	11	3	4
Brachypodium	1	0	0	1	0	1	0
Bromus	406	1	100	505	389	116	57
Calamagrostis	10	0	1	11	9	2	2
Cynosurus	8	0	0	8	8	0	2
Dactylis	325	1	36	360	320	40	342
Danthonia	3	0	0	3	2	1	3
Echinochloa	23	3	5	25	16	9	10
Elymus	10	0	2	12	7	5	8
Enneapogon	0	0	0	0	0	0	0
Eremopoa	2	0	0	2	2	0	2
Eremopyrum	12	0	0	12	12	0	8
Euchlaena	7	0	2	9	7	2	24
Festuca	187	0	5	192	180	12	45
Guadiniopsis	1	0	0	1	1	0	2
Glyceria	2	1	1	2	0	2	0
Helictotrichon	4	0	0	4	4	0	2
Heteranthelium	3	0	1	4	3	1	3
Hordeum	7	0	0	7	7	0	6
Koeleria	7	0	2	9	6	3	3
Lolium	118	0	5	123	121	2	6
Nardus	2	0	0	2	1	1	2
Neurachne	1	1	0	0	0	0	0
Panicum	177	10	49	216	190	26	100
Pennisetum	2	0	0	2	2	0	1
Phacelurus	1	0	0	1	1	0	1
Phalaris	75	0	0	75	74	1	102
Phleum	47	0	0	47	44	3	4
Poa	49	0	0	49	49	0	21
Polypogon	2	0	4	6	3	3	1
Puccinellia	5	1	0	4	0	4	0
Schedonnardus	1	0	0	1	1	0	1
Secale	5	0	0	5	5	0	4
Setaria	104	2	67	169	99	70	35
Sorghum	31	0	0	31	29	2	1
Stipa	1	0	0	1	0	1	0
Tricholaena	2	0	0	2	2	0	2
Tridens	1	0	1	2	1	1	1
Tripsacum	1	0	0	1	0	1	2
Trisetum	4	0	0	4	3	1	1
Triticum	1	0	0	1	0	1	1
Zea--Introd.	1768	0	47	1815	1755	60	1890
St. O.P. Coll.	224	0	35	259	259	0	--
TOTAL ZEA	1992	0	82	2074	2014	60	1890
TOTALS: Genera-47	4117	36	400	4481	4054	427	2807

*Removed because of transfer to other regions, to Glenn Dale Storage or loss of seed due to inability to obtain increase and/or loss of viability.

**Does not include seed list items regrown for seed increase or maintenance of viability.

Genera	Total Active Jan. 1 1966	Removed from Inventory 1966	Rec'd. 1966	Total Active Dec. 31 1966	Seed List 1967	**To Be Increased	Pkts. Distributed
LEGUMES							
Armeria	0	0	1	1	0	1	0
Astragalus	36	2	23	57	23	34	1
Coronilla	23	0	4	27	19	8	37
Dalea	6	0	5	11	2	9	0
Dorycnium	1	0	0	1	1	0	0
Galega	1	0	3	4	1	3	0
Lathyrus	125	0	143	268	111	157	43
Lespedeza	31	0	0	31	26	5	0
Lotus	155	0	7	162	153	9	37
Madia	0	0	1	1	0	1	0
Medicago	675	1	97	771	639	132	144
Melilotus	193	0	86	279	211	68	36
Onobrychis	47	0	15	62	47	15	14
Ononis	3	0	4	7	3	4	0
Psoralea	14	0	9	23	11	12	0
Scorpiurus	23	0	3	26	21	5	0
Tetragonolobus	12	0	5	17	11	6	4
Trifolium	447	3	8	452	444	8	30
Trigonella	129	0	10	139	127	12	8
Vicia	1	0	0	1	0	1	0
TOTALS: Genera-20	1922	6	424	2340	1850	490	354
FRUITS & VEGETABLES							
Allium	337	139	0	198	180	18	228
Apium	49	0	0	49	49	0	118
Asparagus	53	0	0	53	27	26	2
Beta	299	2	0	297	295	2	29
Carica	3	0	0	3	0	3	3
Citrullus	3	0	0	3	0	3	4
Cucumis	480	2	1	479	459	20	281
Cucurbita	381	0	9	390	385	5	643
Daucus	294	0	10	304	215	89	61
Lactuca	263	0	0	263	244	19	27
Lycopersicon	2992	0	24	3016	2569	447	1637
Momordica	0	0	0	0	0	0	1
Orlaya	2	1	0	1	0	1	0
Petroselinum	88	23	0	65	10	55	0
Phaseolus	36	0	0	36	0	36	0
Pisum	1276	0	6	1282	1264	18	818
Prunus	1	0	0	1	0	1	0
Pyrus	2	0	0	2	0	2	0
Rheum	7	0	0	7	4	3	0
Rubus	82	0	0	82	0	82	0
Solanum	1	0	0	1	0	1	5
Spinacia	186	0	1	187	185	2	5
Vaccinium	4	0	0	4	0	4	0
TOTALS: Genera-22	6839	167	51	6723	5886	837	3862

Genera	Total Active Jan. 1 1966	Removed from Inventory 1966*	Rec'd. 1966	Total Active Dec. 31 1966	Seed List 1967	**To Be Increased	Pkts. Distributed
OIL & SPECIAL							
Alyssum	1	0	0	1	1	0	0
Ammi	0	0	0	0	0	0	1
Anethum	19	0	0	19	19	0	5
Arctium	1	0	0	1	1	0	0
Brassica	392	0	32	424	380	44	213
Briza	1	0	2	3	3	0	1
Bupleurum	1	0	0	1	1	0	0
Calendula	3	0	0	3	3	0	1
Camelina	6	0	2	8	8	0	1
Cassia	6	0	0	6	6	0	2
Chenopodium	1	0	1	2	2	0	1
Cichorium	1	0	0	1	1	0	0
Cnicus	0	0	1	1	1	0	0
Crambe	18	0	11	29	29	0	188
Crepis	0	0	1	1	1	0	0
Crotalaria	1	0	0	1	1	0	0
Cyamopsis	5	0	0	5	5	0	0
Cynara	2	0	0	2	2	0	0
Dimorphotheca	1	0	0	1	1	0	0
Ducrosia	1	0	0	1	1	0	0
Echinacea	0	0	1	1	1	0	0
Eruca	31	0	1	32	32	0	0
Euphorbia	8	0	0	8	8	0	24
Foeniculum	2	0	0	2	2	0	1
Glaucium	1	0	0	1	1	0	2
Guizota	1	0	0	1	1	0	0
Helenium	0	0	1	1	1	0	1
Helianthus annuus	273	0	1	274	268	6	80
H. spp.	6	0	0	6	3	3	0
Hibiscus (Kenaf.)	1	0	0	1	1	0	2
Iberis	0	0	2	2	2	0	6
Lallemantia	2	0	1	3	3	0	1
Lappula	1	0	0	1	1	0	0
Lepidium	0	0	1	1	1	0	0
Limnanthes	13	0	4	17	17	0	25
Leonotis	1	0	0	1	1	0	0
Lobularia	1	0	0	1	1	0	0
Lunaria	1	0	0	1	1	0	0
Mentha	11	0	0	11	11	0	0
Osteospermum	1	0	0	1	1	0	0
Perilla	9	0	1	10	10	0	1
Raphanus	6	0	2	8	8	0	0
Ricinus	10	0	0	10	10	0	0
Rosa	1	0	0	1	1	0	0
Rudbeckia	1	0	0	1	1	0	0
Salvia	1	0	0	1	1	0	1
Satureja	5	0	0	5	5	0	0
Schlechtendalia	0	0	2	2	2	0	0
Sesamum	5	0	0	5	5	0	0
Sideritis	1	0	0	1	1	0	0
Sigesbeckia	0	0	1	1	1	0	0

Genera	Total Active Jan. 1 1966	Removed from Inventory 1966*	Rec'd. 1966	Total Active Dec. 31 1966	Seed List 1967	**To Be Increased	Pkts. Distributed
Sinapis	0	0	2	2	2	0	0
Sisymbrium	0	0	1	1	1	0	0
Solanum	9	0	5	14	14	0	0
Spergula	1	0	1	2	2	0	0
Stenachaenium	0	0	1	1	1	0	0
Symphytum	1	0	0	1	1	0	0
Tephrosia	0	0	2	2	2	0	0
Vernonia	3	0	0	3	3	0	2
TOTALS:Genera-58	867	0	80	947	894	53	559

ORNAMENTALS

Genera	Total Active Jan. 1 1966	Removed from Inventory 1966	Rec'd. 1966	Total Active Dec. 31 1966	Use in Program	Plants Distributed 1966
PI Abelia	1	0	0	1	H	0
Abeliophyllum	1	0	0	1	G	0
PI Abies	0	0	1	1	G	0
Acanthopanax	1	0	0	1	G	0
Acer	3	0	3	6	G	0
PI Alnus	6	0	0	6	G	0
PI Amelanchier	1	0	3	4	DG	89
Amorpha	4	0	0	4	HG	0
PI Ardisia	1	0	0	1	G	0
PI Begonia	3	0	0	3	G	0
PI Belancanda	0	0	1	1	G	0
PI Berchemia	1	1	0	0	0	0
Berberis	1	0	0	1	G	0
PI Betula	2	0	3	5	G	0
PI Buddlea	0	0	0	1	DG	82
PI Buxus	22	0	1	23	G	0
PI Camellia	1	0	0	1	G	0
PI Canna	1	0	0	1	G	0
PI Caragana	1	0	1	2	G	0
PI Carpinus	1	0	0	1	G	0
Caryopteris	1	0	0	1	G	0
PI Celastrus	1	0	0	1	G	0
Cercidiphyllum	1	0	0	0	D	39
PI Cerco carbus	1	0	1	2	G	0
PI Chamaebatiaria	0	0	3	3	DG	150
PI Chamaecyparis	0	0	1	1	G	0
PI Chrysanthemum	6	1	0	5	G	0
PI Clematis	1	0	0	1	DG	68
PI Coleus	24	0	0	24	G	0
PI Cornus	2	0	2	4	G	0
Corylus	1	0	0	1	G	0
PI Cotoneaster	5	0	3	8	G	0
Crataegus	1	0	0	1	G	0
Cytisus	0	0	1	1	G	0
PI Damnacanthus	1	0	0	1	G	0
Dasylirion	1	0	0	1	G	0
Deutzia	1	0	0	1	G	0
PI Dianthus	2	0	0	2	DG	179
PI Dierama	0	0	1	1	G	0
Dirca	1	0	0	1	G	0
Duchesnea	0	0	1	1	DG	4
Elaeagnus	1	0	0	1	G	0
Elsholtzia	1	0	0	1	G	0
Erigeron	1	1	0	0	-	0
Eucommia	1	0	0	1	G	0
Euonymus	5	0	0	5	DG	78
PI Euphorbia	1	0	0	1	G	0
Forestiera	0	0	1	1	G	0
Forsythia	1	1	0	0	D	103
Fraxinus	0	0	2	2	G	0
Gleditsia	1	0	0	1	G	0
Haemanthus	0	0	1	1	G	0
PI Hedera	2	0	0	2	G	0
Hydrangea	4	0	0	4	G	0

ORNAMENTALS

Genera	Total Active Jan. 1 1966	Removed from Inventory 1966	Rec'd. 1966	Total Active Dec. 31 1966	Use in Program	Plants Distributed 1966
Hypericum	5	0	1	6	G	0
PI Ilex	18	0	11	29	G	0
Indigofera	0	0	1	1	H	0
Iris	3	0	0	3	G	0
Jamesia	1	0	0	1	G	0
Kohleria	1	0	0	1	G	0
Ledum	1	0	0	1	G	0
PI Ligustrum	3	0	2	5	G	0
PI Lilium	1	1	0	0	-	0
Lippia	1	0	0	1	G	4
Liriope	1	0	0	1	G	0
Lonicera	5	0	0	5	G	0
Lycium	1	0	0	1	G	0
Lythrum	0	0	1	1	DG	87
Malus	5	0	0	5	DG	300
Metasequoia	1	0	0	1	G	0
Momordica	0	0	1	1	G	0
Morus	1	0	0	1	G	0
Pachistima	2	1	0	1	G	0
Passiflora	1	0	0	1	G	0
Penstemon	10	0	0	10	G	0
Perephyllum	1	0	0	1	G	0
Philadelphus	2	0	2	4	DG	84
Photinia	1	0	0	1	G	0
Physocarpus	1	0	0	1	G	0
Pinus	6	0	0	6	G	0
Platanus	0	0	1	1	DG	72
Potentilla	4	0	0	4	DG	4
Prunus	1	0	0	1	G	0
Pyrus	2	0	0	2	H	0
Quercus	1	0	0	1	G	0
Rhododendron	4	0	0	4	G	0
Rhus	0	0	2	2	G	0
Robinia	1	0	0	1	H	0
Rosa	5	0	3	8	G	0
Rubus	1	0	0	1	H	0
Rudbeckia	0	0	1	1	DG	78
PI Salmea	1	1	0	0	-	0
Salvia	1	0	0	1	G	0
PI Sambucus	1	0	0	1	G	0
Scabiosa	1	0	0	1	G	0
Securinega	1	0	0	1	G	0
Sedum	0	0	1	1	G	0
Sheperdia	1	0	0	1	DH	61
Sophora	0	0	1	1	H	0
Spiraea	1	1	3	3	DG	180
Stachyurus	1	0	0	1	G	0
Symplocos	1	0	0	1	G	0
Syringa	6	0	0	6	G	0
Thuja	1	0	1	2	G	0
Ulmus	6	0	2	8	G	0
Vaccinium	3	0	0	3	H	0
Viburnum	1	0	1	2	G	0
Weigela	2	0	0	2	G	0
TOTALS: Genera-89	238	8	65	295		1662