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, 1963

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
Nebraska	*W. R. Kehr, Chairman
Alaska	*H. J. Hodgson
Illinois	*E. B. Patterson
Indiana	*R. C. Pickett
Iowa	*C. P. Wilsie
Kansas	*K. L. Anderson
Michigan	*C. M. Harrison
Minnesota	*L. C. Snyder
Missouri	*A. D. Hibbard
North Dakota	*G. A. Peterson
Ohio	*F. S. Howlett
South Dakota	*S. A. McCrory
Wisconsin	*W. H. Gabelman
Administrative Adviser	E. F. Frolik
U. S. Department of Agriculture	
New Crops Research Branch	*C. O. Erlanson, In Charge
Ass't. Chief, New Crops Research Branch	J. L. Creech
Plant Introduction Investigations	H. L. Hyland
Chemurgic Crop Investigations	J. R. Haun
Cooperative State Experiment Station Service	N. F. Farris
Soil Conservation Service	*A. D. Stoesz
	D. S. Douglas
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	E. E. Leppik

*Voting members of NC-7 Regional Technical Committee

3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

a. Regional Station Program

(1) Physical facilities. The most important development in physical facilities for the regional station in 1963 was completion of the greenhouse addition. This will add approximately 1500 square feet of greenhouse space which will be devoted maily to plant pathology work. It has four isolation compartments and is equipped with automatic ventilation controls, automatic cooling system for summertime use and a 24 x 36 x 60 inch automatic steam sterilizer. The house was completed in November, 1963, and was put to use immediately.

(2) Production. The 1963 growing season is the sixteenth since the establishment of the regional station at Ames on December 1, 1947. The weather was variable, but generally, good seed increases were obtained. There were alternate dry and wet periods but rain was usually received before permanent drouth damange was experienced. The fall, mid-September through November was dry, with not more than 1/2 to 3/4 inch of rainfall for the period. Temperatures and weather were ideal and frost was delayed until about mid-November, thus providing an extra-long growing season.

The spring season opened early but we had one or two nights of frost in late May (about May 23). The early part of the season was hot and dry but rains in mid-July relieved the drouth.

Although the preceding winter was cold and there was little snow cover, winter-killing in perennial plantings was no more severe than anticipated.

The 1963 seed increases will result in an increase of 501 items for the 1963 seed list of available items. A comparison with 1962 is shown as follows:

Inventory of Available Crop Accessions

1962	1963	Increase
10,360	10,861	501

Table I. Number of Genera and Accessions of Various Crops Grown at the Regional Station in 1963.

	No. of Genera		No. of Accessions	
Crop	1962	1963	1962	1963
Grasses	30	23	365	475
Legumes	14	9	157	179
Vegetables	11	12	1157	1236
Oil and Special	29	34	327	235
Ornamental	65	50	185	175
TOTAL	149	128	2191	2300
Carryover of perennial accessions			485	305
TOTAL FOR SEASON			2676	2605

(3) Introductions received. There was a general slight increase in all crops received in 1963 over 1962 which resulted in a slightly larger total for the year (see Table II). The largest increase was in vegetables, which in turn was largely due to tomatoes of which 233 were received.

Table II. Number of Genera and Accessions of the Various Crop Groups Received in 1962 and 1963.

	No. of Genera		No. of Accessions	
Crop	1962	1963	1962	1963
Grasses	12	43	66	89
Legumes	7	16	72	82
Vegetables	11	18	247	487
Oil and Special	6	34	26	41
Ornamental	10	26	37	41
TOTALS	46	137	448	740

(4) Seed distribution by the Regional Station.

Table III. Number of seed packets and other items distributed in 1962 and 1963 by the Regional Station, according to crop group (see Appendix B for further details).

	No. of packets or items	
Crop	1962	1963
Grasses	5015	2856
Legumes	1521	1640
Vegetables	4846	4678
Oil and Special	597	1089
TOTAL PACKETS	11,979	10,263
Ornamental (Plants)	629	277
TOTAL, ALL ITEMS	12,608	10,540

The use of grass introductions fell off rather sharply in 1963 compared with 1962. However, relatively little change occurred in legumes and vegetables. It is of interest to note that the use of oil and special crops nearly doubled in 1963.

Appendix B will show that in the grasses, over 1700 packets of corn were distributed and 340 packets of Panicum, in legumes, 760 Medicago and 264 melilotus; in vegetables, 2730 tomatoes and 630 peas; and in oil crops, 900 sunflowers and nearly 90 Crambe.

(5) Total Seed and Plant Inventory for 1963. A detailed inventory of accessions on hand in 1963, showing items active and inactive, available, and distributed appears in Appendix B. A summary of that inventory appears in Table IV.

Table IV. Summary of Appendix B.

Crop	No. Genera	Total Active 1/1/63	Removed From Inventory 1963	Received 1963	Total Active 12/31/63	Seed List 1963	To Be Increased	Packets, Plants Distributed
Grasses	43	3875	25	89	3939	3667	272	2856
Legumes	16	1710	8	82	1784	1600	184	1640
Vegetables	18	5962	26	487	6423	4953	1470	4678
Oil & Special	34	724	2	41	763	641	122	1089
TOTALS	111	12,271	61	699	12,909	10,861	2,048	10,263
Ornamentals*	76	196	23	41	219	--	--	277
TOTALS	187	12,467	84	740	13,128	10,861	2,048	10,540

* Woody and herbacious ornamentals do not appear on the published seed list. A list of available stock is circulated to interested cooperators and orders are filled from their requests.

(6) Seed Transfers to the National Seed Storage Laboratory. Transfers of reserve quantities of seed of valuable introductions are being made to the National Laboratory. Forty-nine accessions of corn introductions and 14 sunflowers were sent in 1963. Alfalfa and additional lines of corn and tomatoes will be sent in 1964.

Under this program, the Regional Station continues to maintain an active supply of seed stocks of all introductions on hand. Only the "excess" or "reserve" seed, which can be spared without affecting distribution, is transferred. Accessions for which seed cannot be spared must be re-increased before the transfer is made.

(7) Plant Pathology Program

(a) Field Observations and Evaluation of all material planted in fields and greenhouses were continued as in previous years. The reaction of introduced plants to local diseases was evaluated and the degree of their resistance to definite diseases rated systematically throughout the growing season. A total of 3014 accessions of field plants and 420 accessions in greenhouse were rated, most of them 3 to 5 times during the growing season. Results of field observations were compared with inoculation tests and both ratings were incorporated into the 1963 Seed List.

(b) Detection and Interception of Foreign Pathogens on introduced plants. It is the responsibility of Regional Stations to detect an intercept foreign pathogens that are imported by introduced materials. Disease-free seed was produced for distribution in several cases, when the introduced material was found infected by some foreign pathogen. The following foreign pathogens were detected and intercepted during the year 1963:

(1) TMV virus on Lycopersicon esculentum. PI 272629 and 272996 collected from El Salvador, Central America. This pathogen was detected for the second time on material collected in the same place (Sansonate, El Salvador). A year earlier the same pathogen was detected on PI 272833.

(2) Pseudomonas pisi, seed-borne bacterial blight on peas. This dangerous pathogen was detected on several accessions introduced from West Pakistan, West Africa, England, and Germany. Many countries do not permit to import peas infected by bacterial blight. Although the disease is common in the United States, it is necessary to avoid importation of foreign pathogenic strains of this bacterium. Production of disease-free seed is in progress.

(3) Muskmelon mosaic, a seed-borne virus on Cucurbita pepo, PI 285611, introduced from Poland. The early detection of this disease in field permitted the eradication of infected plants, before the spread by insect vector. No further infections were recorded.

This is the second detection of muskmelon mosaic on introduced material. First time this disease was detected and intercepted on Cucurbita pepo, PI 176551 introduced from Turkey.

(c) A new outbreak of squash mosaic. A heavy outbreak of squash mosaic in Ames several years ago necessitated introduction of a special project of eradication of this pathogen from Regional Station. This has been completed now and mosaic-free seed is distributed from Ames.

However, a new light outbreak appeared late last summer, which could be quickly stopped. A printed report will appear in January.

(d) Screening of Sunflowers. Completed and disease-free seed is available for distribution. A printed report about the world distribution of the downy mildew and other seed-borne diseases of sunflowers is available.

Detection of a new race of the down mildew, Plasmopara halstedii and a new virus on sunflower accessinos introduced from Russia and neighboring countries caused a special sunflower screening project in Ames. After 3 years of screening the project is completed now. From 380 screened accessions, 35 have been found infected.

Disease-free seed was produced from infected material and is available for distribution. As a result of this work the Regional Station in Ames can now offer increased sib seed of 230 accessions of sunflowers, free of known foreign diseases.

(e) Sources of Resistance to Corn Diseases. Screening of corn accessions and inoculation tests with Puccinia sorghi, Helminthosporium turcicum, H. maydis, Diplodia zeae, and Fusarium stalk rot were continued. Seven hundred and seventy-five accessions were inoculated with the above-mentioned pathogens in field, 75 accessions in greenhouse. With this method a total of 2530 accessions were tested from the material stored in Ames.

This preliminary testing enabled to select promising accessions as sources for resistance for further testings. Such re-testings were made by A. J. Ullstrup at the Purdue University with 200 accessions evaluating the resistance to Helminthosporium turcicum and to H. maydis. Next season the same material is planned to be tested against Puccinia sorghi and P. polysora.

Further 294 accessions were re-tested by D. C. Foley, Iowa State University. Data are not yet available. Available information is incorporated in the 1963 Seed List.

(f) Screening of Fenugreek, Trigonella foenum graecum to Cercospora traversiana. Main part of the project is finished and disease-free seed is available. In 1963 some newly-obtained accessions were screened.

(g) Production of Disease-Free Seed of Lathyrus was continued. Seed of 60 accessions were produced in greenhouse for field plantings. Most part of the project is completed now and disease-free seed is available.

(h) Screening of Cucurbita Accessions for Resistance to Powdery Mildew. Several wild species and cultivated accessions showed complete resistance to downy mildew, some to aphids, and some tolerance to spider mites. Parallel testings were made in field and greenhouse. Data are incorporated into the 1963 Seed List.

(i) Screening of Cucumis accessions for resistance to powdery mildew was continued. Data in 1963 Seed List.

(j) Observations on alfalfa accessions for resistance to rust, Uromyces striatus was continued. Both years, 1962 and 1963, were heavy rust years in Ames. The project is to be continued.

(k) Screening of introduced peas for bacterial blight, Pseudomonas pisi. This seed-borne pathogen was detected last year on several introduced accessions. It is necessary, therefore, to prevent the foreign strain of this epiphytotic pathogen.

(l) Screening of all peas concerning viruses. Field observations showed that our material is badly infected by mosaic, streaks, stunting and other virus diseases. To avoid the distribution of these diseases, a pathological screening is necessary.

(8) Woody Ornamental Program. This program is cooperative between the thirteen North Central States and the Crops Research Division (New Crops Research Branch). The federal line project which contributes to this work is CRi 2-15, Evaluation and Development of New or Little Known Introduced Ornamentla Plants.

(a) Plant Distribution. One shrub rose, two flowering crabapples and two deciduous trees were distributed to regional trial cooperators during the spring of 1963. Cooperators in 10 states requested 275 plants for 28 trial sites. Plants included Corylus Colurna, Turkish tree hazel; Malus 'Prairie Rose'; Malus 'Evelyn'; Rosa x 'Lillian Gibson' and Quercus imbricaria, Shingle oak. The Lillian Gibson shrub rose was supplied by the Department of Horticulture, South Dakota State College.

(b) Regional Trial Performance Reports. Summaries of cooperator five-year evaluations for 15 shrubs and trees planted in 1957 were prepared and distributed during 1963.

Shrubs

Of considerable interest in the realm of "pay off" accessions is the fact that PI 107630, Ligustrum vulgare, is being propagated by two wholesale nursery firms in Iowa. One firm carries this Yugoslavian plant introduction as PI 107630 on stakes in its propagating benches. The propagator stated that his company's

salesmen tell him that they can sell all the plants of this privet that he can grow. That this is the case is demonstrated by the fact that this firm took 30 M rooted cuttings of PI 107630 to the field in the spring of 1962 and planned to take 60 M rooted cuttings to the field in 1963. A competing wholesaler carries this same material as hardy common privet. It has been determined that this privet was brought into Iowa from the Cheyenne Horticultural Station in 1953. At Cheyenne, PI 107630 was the most successful privet accession under trial.

The summaries of five-year regional trials indicated that the Ligustrum vulgare 'Lodense' was less hardy than other common privet introductions, i.e. PI 26767 from Crimea and PI 107630 from Yugoslavia.

The Colorado dogwood, Cornus stolonifera coloradensis proved to have wide adaptation to regional trial site conditions. It proved to be satisfactory at all plantings for the five-year-period under observation.

The Korean littleleaf box made slow but satisfactory growth in southern [illegible] Wisconsin, southern Minnesota, southeast South Dakota and eastern Nebraska. On northern and western trial sites, this species was considered to be of little use.

Trees

Four crabapple accessions in trial were notes to be hardy at all trial sites. Reports summarized include: Malus baccata columnaris, M. b. mandshurica, M. 'Centennial', and M. 'Radiant'.

Four poplar accessions were summarized during the year. Of these Populus Simonii apparently is more cold tolerant than P. alba pyramidalis, Bolle's poplar; P. nigra italica, Lombardy poplar, P. nigra thevestina, Algerian black poplar. Not one of these accessions proved to be as satisfactory with respect to hardiness and freedom from chlorosis as the False Lombardy poplar.

(c) Sub-Committee Recommendations. The Woody Plant Subcommittee meeting September 4 at the Regional Station agreed to furnish reports for a 10-year summary of plants in regional trial. Information on cultural practices employed at the various trial plantings and planting stock was also requested.

(d) Woody Plant Trial Report Forms. In order to satisfy the request of the sub-committee for a 10-year report and certain other information, the reporting procedures are being revised prior to the 1964 shipments. These revisions are planned to permit ready transfer of trial information to data processing cards.

(9) Public Relations. During 1963, the Regional Station was host to about 170 visitors. These were representatives from private interests, state and federal agencies, various Iowa State University classes, Great Plains Section of the American Society for Horticultural Science, NC-7 Technical Committee, USDA Agricultural Engineers and foreign representatives from the United Kingdom and Australia.

Interviews were given to reporters from newspapers and magazines.

3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS (CONTINUED)

b. Regional Cooperative Program. While a part of this report concerned the more specific activities of the Regional Station, certain portions (like the Woody Ornamental and Plant Pathology Reports)of necessity implied and reflected regional cooperative activities. This portion (Part b.) of the report, however, will concern primarily the regional cooperative activities.

(1) Domestic Exploration. Through financial assistance from the New Crops Research Branch, domestic exploration in the North Central Region was continued. Federal line projects which contribute to this cooperative work are as follows:

CRi 1-11	Fruits and vegetables
CRi 1-12	Field Crops
CRi 1-13	Specialty Crops

During 1963, the small fruit collecting work in Alaska could not be continued because of transfer of their collector. Since the Nebraska Station had on file a proposal for collecting native ornamentals in the Rockies which was previously approved by the NC-7 Technical Committee, the funds were made available to that station. Consequently, over 225 items were collected and arrangements are being made for their evaluation. The work is not complete and it is hoped that the work can be continued in 1964.

(2) Evaluation of New Crops for Industrial Utilization. In 1963, the NC-7 project continued its participation in the evaluation and seed increase of new crops having possible industrial use as a source of oils, waxes, proteins and fiber. This research and evaluation is closely cooperative among project leaders of several state experiment stations, the New Crops Research Branch, USDA-ARS-CR, the NC-7 regional project, and the Northern Utilization Laboratory at Peoria, Illinois. Certain crops are grown for observation at the Regional Station, but evaluations are primarily made by the cooperating State Experiment Stations.

(a) With assistance of funds provided through NC-7 seed contract agreements four states participated in the 1963 program. They are Indiana, Iowa, Minnesota and Missouri.

(b) In the 1963 tests, emphasis for intensive evaluation was placed on the crops Crambe abyssinica, Kenaf, Vernonia anthelmintica and several Sorghums. Several species of Limnanthes are being evaluated in Alaska, northern Minnesota and Michigan.

(c) The following progress was made in 1963:

Vernonia anthelmintica. This crop was grown on a large scale, up to 8-10 acre plots because large amounts of seed are needed. Tests on seed quality are being made. Problems of weed control and more rapid establishment need to be studied more closely, as well as excessive shattering of seed at harvest. To this end, tests for yield, spacing, fertilizer, and herbicidal effect are being conducted. Yields of up to 1100 pounds per acre were obtained on small plots.

Crambe abyssinica. This species continues to hold agronomic promise in the central and northern parts of the region. Several different lines were available in 1963 and yield differences were noted. Yields of nearly 2000 pounds per acre were produced on fertility plots in Indiana.

Hibiscus cannabinus, Kenaf, as a source of pulp fiber is showing some promise in the region. Due to drouth and other reasons, results were variable in 1963. However, a yield of 4 to 5 tons per acre was produced in Indiana and over 10 tons per acre in Kansas.

Sorghums of various species were tested in 1963. All results are not yet available but in some tests, 7-10 tons per acre of stalk material was produced.

(3) Evaluation Program.

(a) Evaluation and Research. The Regional Station coordinates evaluation and research information received from cooperators and disseminates it to the North Central Region as well as to the other three Regional Stations and cooperating agencies of the USDA. An effort is also made to coordinate research on certain crop species or individual accessions in search of valuable germ plasm.

Introductions which appear to have special value or unusual characteristics are summarized in Appendix C of this report. They are preliminary reports and observations, in most cases, and should be considered in this light unless otherwise indicated.

(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 work with the New Crops Research Branch is carried out 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.

(c) State Contributing Projects. In 1963, the NC-7 Regional Project provided funds to assist in the support of 10 contributing projects in 9 states.

A brief summary of state contributing project work underway and reported accomplishments follows:

1. Alaska. "Evaluation of Small Fruits Indigenous to Alaska." No native collections were made during the 1963 fiscal year. Survival of previously collected materials has been very poor with the most success being at Fairbanks. Rubus chamaemorus, R. idaeus, Frageria chilaensis and F. glauca species seem to be completely hardy at Fairbanks and Palmer.

Some of the Fragaria chiloensis and F. glauca accessions have enought plants and characteristics are well enough known that these materials could be made available to interested small fruit breeders. These accessions are extremely hardy and are reported to be in the parentage of Sitka Hybrid, the hardiest known strawberry variety.

In addition to providing genetic material for sources of earliness and hardiness, further documentation of the presence of these useful species has been accomplished. It has been learned that the indigenous Vaccinium and Ribes species do not exhibit the type hardiness that enables them to withstand winters common to cultivated areas in Alaska.

2/ Illinois. "Evaluation of Trifolium, Lotus, Melilotus and Dactylis introductions."

Trifolium. 100 T. pratense introductions were established in solid seeded 10 foot rows on April 17, 1963. Availability of seed limited the trial to one replication with two check varieties, Kenland and Lakeland, alternating at 5 row intervals. The severe drought in central Illinois during the spring and early summer of 1963 should provide a good opportunity to measure establishment and seedling vigor under these conditions.

Lotus. 75 Lotus introductions were established as spaced plants in a nursery on June 15, 1962. Ten check varieties were included with 10 to 40 plants from each introduction. The severe winter during 1962-63 eliminated many non-adapted species and annuals. The following were eliminated by the spring of 1963:

L. pedunculatus	- 10 accessions	L. maraccanus	- 1 accession
L. angustissimus	1 accession	L. ornithopoides	1 "
L. arabicus	1 "	L. peregrinus	1 "
L. carmeli	1 "	L. pusillus	1 "
L. corniculatus v. glaber	1 "	L. weilleri	1 "
L. hispidus	1 "	L. corniculatus	3 accessions
L. lamprocarpus	1 "		

At present it appears that none of these new introductions is as vigorous as the check variety, Empire.

The 39 Lotus introductions established in 1960 in solid-seeded rod rows which have maintained good stands, vigor, and other desirable agronomic characteristics are:

L. corniculatus, USSR - PI's 228150, 228151, 258467
L. corniculatus, Germany - PI 232097
L. pedunculatus, Yugoslavia - PI's 251146, 251147

In conjunction with the Plant Pathology Department of the University of Illinois several introductions and existing varieties were screened to determine their reaction to the pathogen, Phomopsis loti. L. arabicus was found to be extremely susceptible to P. loti. Plants of L. corniculatus v. ciliatus and of the variety Empire were more susceptible than most other species and/or varieties. Empire and Empire-type strains appear to be more susceptible to this pathogen than the so-called upright varieties.

The introductions of Lotus which have been referred to as having desirable agronomic characteristics are currently being cloned for use in an interspecific hybridization program. In addition, seed for rod row evaluation is being collected from the clones established in 1960.

Dactylis. Several of the 38 introductions which were evaluated in the 1961 and 1962 reports were sufficiently winter-hardy, vigorous and leafy to merit further evaluation and selection of individual plants. However, none were as vigorous as Potomac. The better introductions were referred to in the 1962 report. Evaluation during 1963 has reconfirmed preliminary ratings.

The more desirable genotypes from the Dactylis introductions are being selected for use in the breeding program.

3/ Indiana. "Evaluation of Legume and Grass Introductions." Four replications of 10-plant rows of 181 entries of alfalfa were evaluated for potato leafhopper reaction and for agronomic characteristics. The following Medicago falcata entries showed promise for leafhopper resistance:

PI	258751	262532
	258752	263154

Four replications of 10-plant rows of 64 entries of red clover were evaluated. Less than 5% survived the winter and the entries surviving were inferior agronomically. Red clover introductions should not be evaluated per se but should be used in crosses with adapted lines.

Certain reed canarygrass introductions showed outstanding promise for seed shattering resistance as well as leafiness, winter hardiness and vigor. These clones were also evaluated for palatability differences under grazing by sheep. Outstanding differences were noted and reactions were repeatable for two regrowths. Selected clones will be distributed to other stations and studied further. Orchardgrass introductions that were entered into a combining ability study have been outstanding contributors for diversity.

Seed contract funds were made available for evaluation and seed increase of potential new crops.

4/ Iowa. No contributing project.

5/ Kansas. Evaluation of native grasses. Native grass collections made in 1957-1958 and evaluations are serving as source material for strain building and many lines have been given to plant breeders. Additional material is now available in Andropogon gerardi, A. hallii, A. scoparius, Sorghastrum nutans, Panicum virgatum, and Tripsacum dactyloides.

Seed contract funds were made available for evaluation and seed increase of potential new crops.

6/ Michigan. No contributing project. However, seed contract funds were used for evaluation and seed increase of a potential new crop, Limnanthes, for evaluating cucumber introductions, and for increasing seed of open pollinated corn varieties.

Limnanthes increase. Plantings in northern Michigan were established and small amounts of seed were obtained. The 1963 plantings looked exceptionally promising in late July and early August. Considerable seed set was evident at that time and plants bloomed profusely and looked very healthy. However, by mid-August, the entire planting was suddenly killed by an unknown disease.

Cucumber evaluations. A portion of the cucumber collection was screened in 1963 for resistance to tobacco ringspot virus. Results of this work appear in Appendix C of this report.

7/ Minnesota. "Preservation and evaluation of stone fruits." The Breeders Regional Inventory of 170 clones of various stone fruit varieties, species, and hybrids were maintained, as well as nearly 400 other clones which are under test for possible inclusion. Several depleted clones were repropagated.

The inventory of stone fruits in the NC-7 collection at the University of Minnesota Fruit Breeding Farm should be very useful for plant breeders working on stone fruits at other institutions.

Seed contract funds were also made available for evaluation and seed increase of potential new crops.

8/ Missouri. "Evaluation of Lotus corniculatus for resistance to root and crown rot." Seedlings established in 1962 were subjected to root and crown rot disease. To encourage heavy development of root rot the test was located on disease-infested land, and the second year plants were cut at monthly intervals at a height of two inches. A heavy epiphytotic has developed and the evaluation should be satisfactory. At the moment, PI's 251146, 251147 and 251827 show considerable promise.

Promising material found in this evaluation program will be used to develop more persistent varieties.

Seed contract funds were made available for assistance with increasing seed of open pollinated corn varieties on inventory at the Regional Station.

9/ Nebraska. "Preservation of alfalfa clones and preliminary evaluation of plant introductions." Seedlings of 48 new introductions were transplanted in 1963 making a total of 69 under current evaluation and a total of 645 observed during 1949-1963. Field data for current materials include stand, growth habit, vigor and rate of recovery. Results for 1963 are listed in Appendix C of this report.

Five clones with combined resistance to spotted alfalfa and pea aphids were selected from N.S. 30 and propagated for field observations. Entomological Research is cooperative with U.S.D.A. Forage Insect Laboratory. Data, rooted cuttings, and seed were distributed. Permanent nurseries consist of 150 "C" (Conference) and 270 other selected clones.

The work of this project is useful because (1) a constant search for more desirable genetic combinations gives assurance that present yield levels will be maintained or possibly increased. (2) This project gives maximum assurance of perpetuation of those genotypes which may later be used in the construction of superior varieties.

10/ Nebraska. "Evaluation of Native Grasses." Nursery stocks of 15 introduced and native grasses for use in improvement by breeding were screened into 75 types based on growth characteristics and maturity classes.

These nursery stocks provide the genetic variation for selection among clones and the source material from which adapted varieties of native grasses or naturalized varieties of introduced grasses may be produced. Important genetic variations from plant selections from plant introductions have been preserved, e.g., 30 PI numbers of switchgrass; seven in crested wheatgrass; PI 98526 tall wheatgrass. Two new varieties of big bluestem, Champ and Pawnee, were released for certified seed production in 1963.

11/ North Dakota. No contributing project.

12/ Ohio. "Evaluation of domestic and wild species of tomatoes." In 1963 seed of 150 accessions were grown and classified for resistance to tobacco mosaic virus, Alternaria leaf spot, species and horticultural characters. This information is provided to the Regional Station for incorporation in the annual seed list for tomatoes.

Information from the work of this project continues to be useful to workers throughout the world, as indicated by seed requests received.

13/ South Dakota. "Preservation of the Hansen Hardy Fruit Collection." Ample moisture and a good set of fruit made 1962-63 one of the best seasons in many years. A good seed crop was harvested from the crabapples but the apricot and sandcherry crops were light.

The requests for material continue to be for something that is winter hardy. Rootstocks were by far the leading item wanted. In addition, requests for seed of apricot, sandcherry and crabapples exceeded the supply. Since there will not be seed in 1963, the requests for 1964 have now been received.

The importance of hardiness is apparent in places that experience low winter temperatures. The Montana State Nursery at Missoula is growing and planting many hardy crabapples in shelterbelt plantings. Their seed source is from the Hansen collection. In addition to its hardiness, it has ornamental value. The demand for such material is increasing.

14/ Wisconsin. No contributing project.

c. "Pay-off" Introductions for 1963. On the basis of evaluation reports, it becomes evident that certain introductions have real merit due to disease or insect resistance, various other plant characteristics, and other reasons. This germ plasm may be used in the release of introductions as varieties either with or without genetic change, as a contribution to a variety or simply as "tools" such as "genetic bridges." A "pay-off" introduction is considered, at this station, as one for which its merit or value has been proven, or generally accepted by crops workers.

Listed below are several introductions that may be considered as "pay-offs."

Agropyron elongatum.

PI 98526. This line originally came from the U.S.S.R. from the Saratov Institute for Study of Drought. It was presented by N. Vavilov, Bureau of Introduction, Leningrad, having been received April 8, 1932. This line, relatively unchanged, was released by the Nebraska station as 'Nebraska 98526.' In 1963 certified seed was presented to this station for preservation as PI 98526.

Foundation seed was received March 28, 1963, courtesy of Mr. Lamoine Brownlee, Nebraska Foundation Seed Division. It was produced at the Two Rivers Nursery, Waterloo, Nebraska, the site of the old S.C.S. nursery from which the original seed was dispersed. The planting is one of the older but not the first planting there of this grass. The S.C.S. obtained their seed from South Dakota and they in turn obtained the strain from Colorado.

'Nebraska 98526' was a recognized certified variety since 1950 with about 30 growers producing it in the mid 1950's.

The introduction PI 98526 furnished germplasm for two varieties: 'Nebraska 98526' and 'Alkar' in the Pacific Northwest.

Most of the above information was provided by Dr. L. C. Newell, U.S.D.A. grass breeder at Nebraska.

Zea mays

186225 Australia. This yellow dent line was tested for several characteristics and has shown good performance. Perhaps it is best recognized for its corn earworm resistance. Work in the Southern Region has quite well estab-

lished its resistance to this insect, although the plants were 100% infested with larvae, most of them remained in the silk channel and did not reach the ear. Observations at this station show that the husks extend as much as 10 inches beyond the end of the ear. This would suggest mechanical type resistance.

Another observation made at this station which was confirmed in Illinois is that the silks emerge later than the pollen, by about 5 days.

Other reports state that it has good stalk quality and root strength, resistance to stalk rot, no lodging and had low rootworm numbers.

213777 South Dakota var. 'Golden Jewel'. This yellow dent line was received from the Agronomy Department, South Dakota Agricultural Experiment Station in 1954. Its resistance to Puccinia sorghi has been reported and confirmed by several workers, including W. A. Russell, A. L. Hooker, and co-workers. In a publication by Hooker, Russell, Dickson and Flangas, this line is considered to carry the gene Rp^1.

217407 Iowa, variety 'Ladyfinger.' This is a late-maturing, prolific, high quality popcorn, very similar to the ancient popcorns of Peruvian graves. It is a "Standard Exotic" and was presented to this station in 1954 by Dr. W. L. Brown, Pioneer Hi-Bred Corn Co.

It was reported as a pay-off in 1961 but recent developments warrant reporting it again. Originally, it was reported for its resistance to Helminthosporium turcicum and H. maydis by A. J. Ullstrup, its prolificacy which is being used in breeding programs. Increased use is being made of it for the above purposes.

It was established by A. L. Hooker and A. J. Ullstrup that blight resistance is contributed and controlled by the single dominant gene, Ht. Ullstrup further reported that resistance to northern corn leaf blight is maintained under severe epidemics in Kenya, East Africa and in Hyderabad, India, as reported by correspondents to whom it was sent for observation.

217412 Iowa variety 'Tom Thumb.' A yellow flint-popcorn which is very early and small-eared. Does well only in the north. Excellent for greenhouse experiments in the wintertime. A "Standard Exotic." Received from Dr. W. L. Brown, Pioneer Hi-Bred Corn Co. in 1954. The earliness is being used quite generally by corn breeders and seed of this line is in demand.

217413 Iowa variety 'Zapalote Chico.' Originally, this line is from southern Mexico, but easy to grow as far north as Minnesota because it is comparatively independent of length of day. 8 to 10 rowed. Very short ears, white dent with very dented kernels. A "Standard Exotic." Presented to this station in 1954 by Dr. W. L. Brown, Pioneer Hi-Bred Corn Co.

This line was reported in 1960 as a pay-off but recent developments warrant reporting it again.

Originally it was reported for its good corn earworm resistance. This has since been reconfirmed by several sources. Its excellent resistance has been reported by southern workers as well as northern workers. It has a very tight, heavy husk and it was suggested that this might be a factor which would enhance its resistance. It is being used in breeding programs and attempts are being made to transfer resistance to sweet corn.

221884 Missouri, variety 'Pipe Corn.' This line was presented to this

station in 1954 by Dr. M. S. Zuber of Missouri.

Contributed germplasm to four inbred lines. Mo 15W and Mo 16W were derived from open pollinated Pipe corn. These two inbreds were selected for the production of cob pipes and they are two of the parents for the hybrid Mo Pipe 12 with the pedigree (Mo 15W x Mo 16W)(Mo 8W x Mo 9W). All four inbred lines were derived from the same parentage. Inbred lines were released jointly by the Missouri Agricultural Experiment Station and the U.S.D.A.

Lotus corniculatus

228150 U.S.S.R. Received in 1955 from Prof. B. P. Sokolov, Russian Delegation. This line was described in 1959 at this station as being hardy, productive, spreading, uniform, and vigorous. Subsequent evaluation reports from Lotus workers have confirmed this. In Canada, it gave good production and remained persistent. Another report stated that it has promise as source material for selection. In Illinois evaluations, good stands were established and maintained. In Iowa, promising selections were made from this line.

258467. U.S.S.R. var. 'Morshansk 528.' Originally from the All-Union Institute of Plant Industry, Leningrad, U.S.S.R. The city of Morshansk is about 200 miles southeast of Moscow. Seed was presented to this station in 1959 by Dr. J. S. Bubar, Macdonald College, Quebec, Canada.

At Quebec, as a hay type, it yielded higher than 5 well-known varieties: Empire, Viking, Mansfield, Tama and Cascade. At Illinois, it was reported to be excellent in maintenance of stand and vigor, had other desirable characteristics, and to hold promise as source material for selection.

In Canada, it was used in the development of the variety 'Leo' released in 1963. This variety was developed by J. S. Bubar from single plant introduction of the U.S.S.R. variety 'Morshansk 528', which he obtained from the All-Union Institute of Plant Breeding.

Medicago falcata

PI 24455	U.S.S.R.
28070	"
28071	"

The variety 'Travois' released by the South Dakota station in 1962 is believed to have received germ plasm from the above three alfalfa introductions.

"During the years 1949-1950 an extensive source nursery was established. These plants were derived from root proliferating strains used in breeding programs in Canada and from naturally occurring hybrids between Cossack and Semipalatinsk which were discovered in an old stand in Perkins County, South Dakota. The root proliferating trait in these populations is believed to have been derived from three yellow flowered alfalfas (S.P.I. 28070, 28071, and 24455) collected by Dr. N. E. Hansen."

Clones were selected and tested for such characteristics as (1) lateral spread, (2) growth habit, (3) rapidity of recovery following cutting, and (4) resistance to bacterial wilt and other foliage and stem diseases. On these bases, 10 plants were selected and incorporated into the synthetic variety, Travois.

Medicago sativa

204889 Turkey. Best known for its resistance to potato leafhopper. Originally, W. R. Kehr, Nebraska, reported this resistance and it has since

been further evaluated and incorporated into breeding programs for this purpose. It has contributed leafhopper resistance to Nebraska synthetic NS 30 which showed resistance in 1962. PI's 206278 and 234224 also contributed leafhopper resistance.

206278 Turkey. This line is also recognized for its leafhopper resistance and it was used in Nebraska Synthetic NS 30 as was PI 204889 and 234224.

243224 Iran. Same characteristics as mentioned for 204889 and 206278 above. Also used in Nebraska Synthetic NS 30.

Melilotus alba

284969 Wisconsin. Contributed germplasm to low coumarin variety Denta. Obtained from Rostov-on-Don from which plants with resistance to Phytophthera root rot were selected. Used in development of variety 'Denta' released cooperatively by the Wisconsin Station and Crops Research Division, U.S.D.A. Wisconsin Acc. No. 15. Crosses involved M. Dentata from Saratov, PI 284970, Hubam, Evergreen, Sangamon, Wisconsin Late and PI 120048 (collected in Turkey by Westover and Wellman in 1937).

Unfortunately, seed of PI 120048 was lost but through courtesy and efforts of Dr. W. K. Smith, Wisconsin, Wisconsin accession 15, used in Denta as described above, was rejuvenated and presented to this station for maintenance.

Also, the variety Sangamon is now maintained at this Station after having been increased by the Illinois Station in 1956.

Melilotus dentata

284970 Wisconsin contributed germplasm to low coumarin variety, 'Denta.' Originally the line was obtained by Dr. R. A. Brink in 1934 through the Bureau of Plant Introduction, Leningrad, originally from Saratov, U.S.S.R., Wisconsin accession No. 91. A low coumarin species used in a cross with Hubam, an annual variety of M. alba, in 1941. Progeny backcrossed to high coumarin lines, Evergreen, Sangamon, Wisconsin Late, PI 120048 and another introduction from Rostov-on-Don which contributed Phytophthera root rot resistance. It is believed by this writer that the latter line is now PI 284969 described above.

Low coumarin lines were selected and carried as Line W-31 and released as variety 'Denta' in April, 1961, as a low coumarin sweet clover variety.

Also, through the courtesy and efforts of Dr. W. K. Smith, this line was rejuvenated, presented to this station, and numbered for future preservation.

Trifolium alexandrinum

164413 India
209016 S. Africa
214205 Italy
220122 Afghanistan
220147 Pakistan
217542 Pakistan
233811 Italy

These above introductions all contributed germplasm to the variety 'Nile' developed by the Rudy-Patrick Seed Co. and named in December 1962. Developed primarily for annual forage and green manure use. Developed by recurrent selection.

Lycopersicon esculentum

128887 France. Variety Perfection. Known for its resistance to potato virus Y as originally reported to us by Dr. J. M. Walter. Used in cross with 'Manalucie' in an effort to combine resistance to potato virus Y with the disease resistance of Manalucie.

4. USEFULNESS OF FINDINGS;

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 U.S.D.A. (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, is beneficial to the workers themselves, 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 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 work, regional testing of new crops and woody ornamentals, and coordination of regional cooperative program.

Regional cooperative work planned includes, but not limited to the following:

a. Continue domestic explorations for and evaluation of ornamentals, native grasses, and small fruits.

b. Further plantings and evaluations of grass and legume introductions.

c. Continue evaluation of new crops and increasing seed for chemical analyses. More specific research on selection, breeding, and physiological studies of potential new crops is anticipated at several states. Much of this work to be state supported.

d. Continue evaluations of vegetable introductions at several states.

e. Through seed contract funds, obtain assistance from several states for re-increase of open pollinated corn varieties, onion introductions and other crops.

f. Send additional introductions to the National Seed Storage Laboratory for storage.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR.

a. Regional Station

Informal as well as formal publications issued in 1963 are listed below:

(1) 1962 seed list of available introductions.

(2) Annual reports for NC-7 Technical Committee and the Cooperative State Experiment Station Service, including a summary of promising introductions.

(3) Newspaper and magazine articles which concern station activities. (Written by reporters from interviews).

(4) A. F. Dodge. 1962. Five-year report on regional plantings of woody ornamental and shelter plants in the North Central Region, 1957 to 1961. Loose leaf notebook, North Central Regional Plant Introduction Station, Ames, Iowa. 20 pp., 15 maps.

(5) A. F. Dodge. 1962. North Central Regional plantings of woody ornamental and shelter plant introductions. Proceedings Plant Propagators Society 12: 179-200.

(6) E. E. Leppik. 1962. Distribution of downy mildew and some other seed-borne pathogens on sunflowers. FAO Plant Protection Bulletin 10:126-129.

(7) E. E. Leppik. 1963. Some epiphytotic aspects of squash mosaic. Manuscript accepted for publication in Plant Disease Reporter.

b. Illinois

(1) A. L. Hooker. 1961. A new type of resistance in corn to Helminthosporium turcicum. Plant Disease Reporter 45: 780-781.

(2) A. L. Hooker. 1962. Corn leaf diseases. Seventeenth Annual Hybrid Corn Industry Research Conference, 1962. American Seed Trade Association 17: 24-36.

(3) A. L. Hooker, 1963. Inheritance of chlorotic-lesion resistance to Helminthosporium turcicum in seedling corn. Phytopathology 53:660-661.

(4) H. M. Hilu and A. L. Hooker. 1963. Monogenic chlorotic lesion resistance to Helminthosporium turcicum in corn seedlings. Phytopathology 53: 909-912.

c. Indiana

(1) Muneo Iizuka and Jules Janick. 1962. Cytogenetic analysis of sex determination in Spinacia oleracea. Genetics 47: 1225-1241.

(2) Muneo Iizuka and Jules Janick. 1963. Sex chromosome translocations in Spinacia oleracea. Genetics 48: 273-282.

(3) A. J. Ullstrup. 1963. Sources of resistance to northern corn leaf blight. Plant Disease Reporter 47:107-108.

d. Michigan

H. H. Murakishi and S. Honma. 1963. Resistance to tobacco mosaic virus in Lycopersicon hybrids evaluated by potato virus X synergy. Euphytica 12:27-31.

e. Minnesota

R. G. Robinson. New crops may expand Minnesota "oil wells." Minn. Farm and Home Sci. 20(2): 13-15. Winter 1963.

f. Nebraska

(1) D. P. Coyne, M. L. Schuster, and S. Al-Yasiri. 1963. Reaction studies of bean species and varieties to common blight and bacterial wilt. Plant Disease Reporter 47(6): 534-537.

(2) G. R. Manglitz and H. J. Gorz. Sources of resistance to the sweetclover aphid in introduced species of Melilotus. ARS 33-86, 8 pp., 5 tables. October 1963.

g. Cooperative publication

Northern Utilization Laboratory, Peoria, Illinois and Mississippi Agricultural Experiment Station:

(1) C. W. Blessin, J. D. Brecher, R. J. Dimler, C. O. Grogan, and C. M. Campbell. 1963. Carotenoids of corn and sorghum. III. Variation in xanthophylls and carotenes in hybrid, inbred, and exotic corn lines. Cereal Chemistry 40(4): 436-442.

h. Canada

Eric D. Putt. 1963. Sunflowers. Field Crop Abstracts (16(1): 1-6.

7. APPROVED:

January 27, 1964
Date

C. M. R. Kehr
Chairman, Technical Committee

January 27, 1964
Date

E. J. Frolik
Regional Administrative Adviser

APPENDIX A

NC-7 STATE CONTRIBUTING PROJECTS, 1963-64 WHICH RECEIVE ASSISTANCE WITH REGIONAL RESEARCH FUNDS

1. Alaska: The Preservation, Multiplication and Evaluation of Indigenous Alaskan Rubus, Ribes, Vaccinium and Frageria. Initiated 7/1/60, $1,000. annually. Project 74.

2. Illinois: The collection, Preservation, and Extensive Evaluation of Trifolium, Lotus, Melilotus, and Dactylis Introductions. Initiated 7/1/56, $500. annually.

3. Indiana: Evaluation of Legume and Grass Introductions. Intitiated 7/1/56, $1,000 annually. Project 890.

4. Kansas: Multiplication, Preservation, and Determination of Potential Value of Forage Grasses and Legumes. Initiated 7/1/49, $1,100 annually as of July 1, 1959. Project 287.

5. Minnesota: Introduction Preservation, and Evaluation of Stone Fruits of Probably Potential Value to the North Central Region. Initiated 7/1/50, $1,000 annually. Project 2119 RRF, Hort 2221.

6. Missouri: The Evaluation of Introductions of Lotus corniculatus for resistance to root and crown rot. Initiated 7/1/60, $1,000 annually.

7. Nebraska: Preservation of Alfalfa Clones and Seed Stocks Needed in Alfalfa Improvement and Preliminary Evaluation of Plant Introductions. Initiated 7/1/49, $1,000 annually. Project 347.

8. Nebraska: The Introduction, Multiplication, Preservation, and Determination of Potential Value of New Accessions and Strains of Native and Exotic Grasses. Initiated 7/1/49, $1,100 annually. Project 348.

9. Ohio: The Evaluation of the Collection of Domestic and Wild Species of Tomato, and the Maintenance of the Desirable Accessions and Valuable Breeding Stocks. Initiated 7/1/49, $1,500 annually. Project Hatch 72.

10 South Dakota: The Collecting, Preserving, Cataloguing, Propagating, and Testing of Fruit Plants having Potential Genetic Value. Initiated 7/1/49, $2,000 annually as of July 1, 1959. Project 174.

APPENDIX B

Inventory and Summary of Accessions Maintained and Received Through 1963.

Genera	Total Active Jan. 1 1963	Removed from Inventory 1963*	Received 1963	Total Active Dec. 31, 1963	Seed List 1963	**To be Increased	Packets Distributed.
GRASSED AND FIELD CROPS							
Aegilops	120	0	1	121	106	15	114
Agropyron	186	0	1	187	168	19	98
Agrostis	91	1	7	97	83	14	100
Alopecurus	34	0	0	34	30	4	6
Apera	5	0	0	5	5	0	1
Arrhenatherum	11	0	0	11	11	0	13
Bromus	388	1	5	392	359	33	102
Calamagrostis	10	0	0	10	9	1	4
Cynosurus	8	0	0	8	8	0	1
Dactylis	338	0	0	338	294	44	9
Danthonia	3	0	0	3	2	1	1
Echinochloa	16	0	0	16	16	0	19
Elymus	10	0	0	10	7	3	4
Eremopoa	2	0	0	2	2	0	0
Euchlaena	3	0	0	3	2	1	16
Festuca	179	0	0	179	171	8	77
Guadiniopsis	1	0	0	1	0	1	0
Glyceria	1	0	4	5	0	5	0
Helictotrichon	4	0	0	4	3	1	0
Heteranthelium	3	0	0	3	3	0	0
Hordeum	8	0	0	8	7	1	0
Koeleria	7	0	0	7	6	1	1
Lolium	118	0	0	118	116	2	28
Nardus	2	0	0	2	0	2	0
Neurachne	1	0	0	1	0	1	0
Panicum	167	5	4	166	149	17	338
Pennisetum	1	0	0	1	1	0	1
Phacelurus	1	0	0	1	1	0	0
Phalaris	62	0	1	63	63	0	16
Phleum	47	0	0	47	44	3	27
Poa	50	1	0	49	49	0	28
Polypogon	1	0	1	2	1	1	0
Puccinellia	2	0	3	5	0	5	0
Schedonnardus	1	0	0	1	1	0	0
Secale	4	0	0	4	4	0	8
Setaria	99	6	4	97	91	6	97
Sorghum	16	0	0	16	16	0	3
Tricholaena	2	0	0	2	2	0	0
Tridens	1	0	0	1	1	0	1
Tripsacum	1	0	0	1	1	0	0
Trisetum	4	0	0	4	3	1	0
Triticum	1	0	0	1	1	0	0
Zea--Introd.	1642	10	58	1690	1608	82	--
State O.P.Coll.	224	1	0	223	223	0	--
TOTAL ZEA	1866	11	58	1913	1831	82	1743
TOTALS: Genera-43	3875	25	89	3939	3667	272	2856

* 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.

APPENDIX B

Genera	Total Active Jan. 1 1963	Removed from Inventory 1963	Received 1963	Total Active Dec.31 1963	Seed List	**To be Increased	Packets Distributed
LEGUMES							
Anthyllis	2	0	0	2	1	1	0
Astragalus	36	0	0	36	22	14	24
Coronilla	18	0	3	21	13	8	64
Dalea	4	0	0	4	2	2	3
Lathyrus	127	1	1	127	84	43	66
Lespedeza	1	0	0	1	1	0	3
Listia	1	1	0	0	--	--	1
Lotus	154	0	0	154	154	0	104
Medicago	572	1	43	614	574	40	763
Melilotus	170	0	8	178	162	16	264
Onobrychis	47	0	0	47	46	1	127
Psoralea	10	1	3	12	6	6	0
Scorpiurus	7	0	9	16	7	9	2
Tetragonolobus	3	0	3	6	3	3	2
Trifolium	425	4	11	432	398	34	204
Trigonella	133	0	1	134	127	7	13
TOTALS: Genera-16	1710	8	82	1784	1600	184	1640
FRUITS & VEGETABLES							
Allium	282	0	67	349	172	177	142
Apium	57	8	0	49	49	0	17
Asparagus	55	4	2	53	17	36	3
Beta	284	3	13	294	275	19	286
Cucumis	436	2	29	463	423	40	203
Cucurbita	397	0	9	406	390	16	27
Daucus	245	3	41	283	171	112	289
Lactuca	264	0	12	276	216	60	3
Luffa	3	0	0	3	0	3	0
Lycopersicon	2419	2	233	2650	1916	734	2734
Phaseolus	36	0	0	36	0	36	0
Pisum	1192	1	78	1269	1145	124	634
Prunus	1	0	0	1	0	1	0
Pyrus	2	0	0	2	0	2	0
Rheum	7	0	0	7	1	6	0
Rubus	82	0	0	82	0	82	0
Spinacia	196	3	3	196	178	18	340
Vaccinium	4	0	0	4	0	4	0
TOTALS: Genera-18	5962	26	487	6423	4953	1470	4678

APPENDIX B

Genera	Total Active Jan. 1 1963	Removed from Inventory 1963	Received 1963	Total Active Dec. 31 1963	Seed List	**To be Increased	Packets Distributed.
OIL & SPECIAL							
Anethum	---	---	3	3	0	3	4
Brassica	369	0	2	371	334	37	30
Camelina	2	0	0	2	2	0	0
Cassia	1	0	3	4	1	3	1
Cichorium	---	---	1	1	1	0	0
Chenopodium	1	0	0	1	0	1	0
Crambe	11	0	0	11	11	0	87
Crotalaria	---	---	1	1	1	0	5
Cyamopsis	5	0	0	5	0	5	0
Cynara	2	0	0	2	0	2	0
Dimorphotheca	1	---	0	1	0	1	0
Eruca	32	0	0	32	32	0	0
Euphorbia	2	0	0	2	2	0	1
Foeniculum	2	---	0	2	1	1	10
Guizotia	1	0	0	1	0	1	0
Helianthus annuus	221	0	28	249	221	28	900
Helianthus spp.	6	0	0	6	5	1	9
Hibiscus (Kenaf)	1	0	0	1	0	1	0
Lallemantia	2	0	0	2	0	2	1
Limnanthes	8	0	1	9	1	8	20
Lunaria	---	---	1	1	0	1	0
Mentha	11	0	0	11	7	4	0
Ononis	3	0	0	3	3	0	6
Osteospermum	1	0	0	1	0	1	0
Perilla	11	2	0	9	9	0	0
Raphanus	6	0	0	6	6	0	5
Ricinus	10	0	0	10	0	10	0
Rosa	1	0	0	1	1	0	0
Rudbeckia	1	0	0	1	0	1	0
Salvia	1	0	0	1	0	1	0
Satureja	5	0	0	5	1	4	1
Scabiosis	1	0	0	1	0	1	0
Sesamum	5	0	0	5	0	5	0
Symphytum	1	0	0	1	1	0	1
Vernonia	---	---	1	1	1	0	8
TOTALS: Genera-34	724	2	41	763	641	122	1089

APPENDIX B

ORNAMENTALS

Genera	Total Active Jan. 1 1963	Removed from Inventory 1963	Received 1963	Total Active Dec.31 1963	Use in Program	Plants Distributed - 1963
PI Abelia	1	0	0	1	G	0
Acanthopanax	1	0	0	1	H	0
Acer	1	0	0	1	G	0
Albizia	1	1	0	0	-	0
Alnus	0	0	1	1	P	0
Amorpha	1	0	0	1	PG	0
PI Anagyris	1	1	0	0	-	0
PI Ardisia	1	0	0	1	G	0
PI Begonia	0	0	4	4	G	0
Berberis	2	1	1	2	G	0
PI Betula	2	0	0	2	G	0
PI Berchemia	1	0	0	1	PG	0
PI Buxus	24	1	0	23	PG	0
PI Camellia	1	0	0	1	G	0
Caragana	2	1	0	1	H	0
Caryopteris	1	0	0	1	PG	0
PI Celastrus	0	0	1	1	G	0
PI Chrysanthemum	57	11	3	49	G	2
PI Coleus	23	0	0	23	G	0
Cornus	3	1	0	2	G	0
Corylus	1	0	0	1	DG	74
PI Cotoneaster	0	0	3	3	G	0
Dianthus	1	1	2	2	G	0
PI Damnacanthus	0	0	1	1	G	0
Elaeagnus	0	0	1	1	G	0
Elsholtzia	1	0	0	1	H	0
Erigeron	0	0	1	1	G	0
Eucommia	1	0	0	1	GH	0
Euonymus (2 PI)	3	0	1	4	GP	0
PI Euphorbia	1	0	0	1	G	0
Forsythia	1	0	0	1	H	0
PI Hedera	1	0	0	1	G	0
Hovenia	1	1	0	0	-	0
Hydrangea	1	0	1	2	G	0
Hypericum	0	0	3	3	G	0
Indigofera	1	1	0	0	-	0
PI Ilex	5	0	5	10	G	0
PI Iris	1	0	0	1	G	0
Jamesia	0	0	1	1	P	0
PI Kohleria	1	0	0	1	G	0
Lapeirousia	1	0	0	1	-	0
Larix	1	0	1	2	P	0
PI Ligustrum	1	0	1	2	P	0
PI Lilium	0	0	1	1	G	0
Lippia	0	0	1	1	G	0
PI Liriope	0	0	1	1	G	0

APPENDIX B

Genera	Total Active Jan. 1 1963	Removed from Inventory 1963	Received 1963	Total Active Dec.31 1963	Use in Program	Plants Distributed - 1963
Lonicera (1 PI)	5	0	0	5	GH	0
Malus (1 PI)	4	1	0	3	HD	65
PI Metasequoia	0	0	1	1	P	0
PI Morus	1	0	0	1	-	0
Pachystima	1	0	2	3	HP	0
PI Passiflora	1	0	0	1	G	0
PI Philadelphus	2	0	0	2	P	0
PI Photinia	1	0	0	1	G	0
Physocarpus	1	0	0	1	G	0
PI Pinus	3	0	0	3	G	0
Potentilla	1	0	1	2	G	0
PI Prunus	1	1	0	0	0	0
Pyracantha	1	0	0	1	H	0
PI Pyrus	2	0	0	2	-	0
Quercus	1	0	0	1	D	60
PI Rhododendron	3	0	0	3	G	0
Ribes	1	0	0	1	H	0
Rosa	2	0	1	3	HGD	76
Rubus	1	0	0	1	H	0
Salix (3 PI)	5	0	0	5	GH	0
PI Salmia	1	0	0	1	G	0
PI Salvia	1	0	0	1	G	0
PI Sambucus	1	0	0	1	P	0
PI Sarcandra	1	0	0	1	G	0
PI Scabiosa	1	0	0	1	G	0
Securinega	1	0	0	1	H	0
PI Shepherdia	2	0	0	2	-	0
Spiraea	1	0	1	2	G	0
Strobilanthes	1	0	0	1	G	0
Styrax	0	0	1	1	G	0
Syringa	1	0	0	1	G	0
Thuja	1	0	0	1	GH	0
Vaccinium	1	1	0	0	-	-
TOTALS: Genera-76	196	23	41	219		277