

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, 1961

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

Michigan
Alaska
Illinois
Indiana
Iowa
Kansas
Minnesota
Missouri
Nebraska
North Dakota
Ohio
South Dakota
Wisconsin

Representatives

*C. M. Harrison, Chairman
*C. E. Logsdon
*E. B. Patterson
*R. C. Pickett
*C. P. Wilsie
*R. V. Olson
*A. N. Wilcox
*A. D. Hibbard
*W. R. Kehr
*G. A. Peterson
*F. S. Howlett
*S. A. McCrory
*W. H. Gabelman

Administrative Adviser

E. F. Frolik

U. S. Department of Agriculture

New Crops Research Branch
Crop Breeding Stock Investigations
Plant Introduction Investigations
Chemurgic Crop Investigations
State Experiment Station Division

Soil Conservation Service

*C. O. Erlanson, In Charge
W. E. Whitehouse
H. L. Hyland
J. R. Haun
N. F. Farris
W. C. Kennard
*A. D. Stoesz
D. S. Douglas

North Central Regional Plant Introduction Station, Ames, Iowa

Regional Coordinator
Horticulturist
Plant Pathologist

W. H. Skrdla
A. F. Dodge
E. E. Leppik

* Voting members of NC-7 Regional Technical Committee

3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

a. Regional Station Program

(1) Production

The year 1961 was the fourteenth crop year since the establishment of the North Central Regional Station. Generally, the mid and latter part of 1961 was a favorable year for seed increase. Spring weather was not too good for increasing spring annuals like peas and many forage grasses and legumes. Many new items will appear on the 1961 seed list. The following is a comparison of the 1960 and 1961 inventory of "available" or "seed list" items:

<u>1960</u>	<u>1961</u>	<u>Increase</u>
9060	9802	742

Much winter-killing occurred during the winter of 1960-61, probably due to low temperatures and lack of snow cover prior to January. Table I shows the number of accessions planted and maintained at the Regional Station in 1961, compared with 1960. The decrease in the perennial grass and legume plantings is partly due to an anticipated increase in vegetable and special crops in 1961 and also to an anticipated diversion of operations funds, to be used with other funds, for a proposed greenhouse addition in 1961-62.

Increasing the seed of older Brassica introductions, received from Glenn Dale storage, accounts for the high number of special crop accessions grown in 1961. These are mostly annual rapes and other Brassics which might be of interest as possible oil-producing industrial crops.

The increase in vegetables grown is partly due to the large number of new tomato introductions received. A total of 710 tomatoes were received and it will take several years to increase them.

Table I. Number of genera and accessions of various crops grown at the Regional Station in 1961.

<u>Crop</u>	<u>No. of genera</u>		<u>No. of accessions</u>	
	<u>1960</u>	<u>1961</u>	<u>1960</u>	<u>1961</u>
Grasses	35	37	920	562
Legumes	17	15	604	389
Vegetables	9	10	783	1065
Ornamental	45	15	97	80
Oil & Special	<u>15</u>	<u>23</u>	<u>67</u>	<u>536</u>
Total	121	100	2471	2632
Carryover of perennial accessions			<u>1031</u>	<u>750</u>
Total for the season			3502	3382

(2) Introductions received. Table II shows the number of introductions received in 1961, compared with 1960. There was a marked decrease in new accessions of all crops but vegetables. The total increase in vegetables is due to the large tomato collection discussed above.

Table II. Number of genera and accessions of the various crop groups received in 1960 and 1961.

<u>Crop</u>	<u>No. of genera</u>		<u>No. of accessions</u>	
	<u>1960</u>	<u>1961</u>	<u>1960</u>	<u>1961</u>
Grasses	18	13	218	93
Legumes	10	6	103	67
Vegetables	12	12	517	1054
Oil & Special	6	3	461	25
Totals	46	34	1299	1239

(3) Seed distributed by the Regional Station.

Table III. Number of seed packets and other items distributed in 1960 and 1961 by the Regional Station, according to crop group (See Appendix B for further details)

<u>Crop</u>	<u>No. of packets or items</u>	
	<u>1960</u>	<u>1961</u>
Grasses	4262	4093
Legumes	1460	1138
Vegetables	3090	10965
Oil & Special	839	1164
Total packets	9651	17360
Ornamental (plants)	1092	767
Total, all items	10,743	18,127

It is gratifying to observe that the upswing in use of corn introductions in 1960 has been maintained in 1961 (3060 of the 4093 packets of grasses represents corn). In view of the importance of corn in this region and the large amount of untested germplasm available at this Station, we hope that corn breeders will continue to avail themselves of this material.

Tomatoes continue to be an important crop among the vegetables. Of the 10,965 packets of vegetables distributed, 7730 were tomatoes. This represents several requests for all available lines (about 1600) to be used for various screening purposes.

(4) Total seed and plant inventory for 1961. A detailed inventory of accessions on hand in 1961, showing active and inactive items, available items, material distributed, etc. appears in Appendix B. A summary of that inventory appears in Table IV

Table IV. Summary of Appendix B

Crop	No. General	1960 total cumulative	Removed from inventory 1961	Received 1961	1961 Net cumulative	Seed List 1961	To be increased	Packets, Plants Distributed
Grasses	52	3778	37	93	3835	3486	349	4093
Legumes	18	1602	15	67	1654	1380	274	1138
Fruits & Vegetables	20	4864	90	1054	5828	4396	1432	10965
Ornamental, Oil & Special Group I.								
Oil & Special	20	721	57	25	689	540	149	1164
TOTALS:	110	10966	199	1239	12006	9802	2204	17360
Group II.*								
Ornamentals	75	243	83	24	185	-	-	767
TOTALS:	185	11209	282	1263	12191	9802	2204	18127

* Group II. Woody and herbaceous 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.

(5) Seed transfers to the National Seed Storage Laboratory. Transfers of reserve seed quantities of valuable introductions are being made to the National Laboratory. In 1961, over 1500 tomato accessions were transferred. Transfers of reserve seed of other crops is anticipated for early 1962.

Under this program, the Regional Station continues to maintain an active supply or seed stocks of all introductions on hand. Only the "excess" or "reserve" seed of valuable lines, which can be spared without affecting distribution, is transferred.

(6) Plant Pathology Program. In addition to disease observation and evaluation of all material planted in fields and greenhouses, several special screening programs were initiated or continued from previous years.

1. Screening of corn accessions and inoculation experiments with Helminthosporium turcicum and Puccinia sorghi, in cooperation with the Department of Botany and Plant Pathology, ISU, was continued.

This program became necessary because the rust and leaf spot resistance of most corn accessions stored at the Ames Station were not known. The whole program will be completed in four years. Among 566 accessions inoculated in 1961, 14 accessions showed relative resistance to rust and 2 to leaf spot. These prospective introductions are subject to further study.

2. The screening of all fenugreek accessions stored at the Ames Station is, after three years work, almost finished. This program was initiated in 1958 to eliminate the distribution of a destructive disease caused by Cercospora traversiana, new to the United States. This pathogen was imported by Plant Introduction seed samples from the Near East. From the stored material, 105 accessions were cultivated in greenhouses and from 60 infected accessions, disease free seed was produced for distribution. Detailed results of this work is reported in the Disease Reports of the Reg. Plant Intro. Station, Ames, Iowa, No. 1 and No. 4, 1959, 1960.

3. Screening of Lathyrus accessions introduced from the Near East revealed a new race of Ascochyta pisi, imported by seed. During the year 1961, 72 accessions were screened and from 46 infected accessions, disease free seed was produced and is now available for distribution. It is expected that this program will prevent distribution of a new race of this pathogen in the United States.

4. Screening of all sunflower accessions for downy mildew, Plasmopara halstedii, is directed toward the elimination of some new races first reported in Russia and detected at Ames in seed received from various countries of the Near East.

Several epiphytotic diseases, new for the North Central Region, imported by seed from foreign countries have been detected at the Ames Station and eliminated before they could be distributed in this country. Most important are:

1. Ustilago bullata Berk., loose smut on seed of Bromus danthoniae (Desf.) Trin. introduced by P.I. 245732 from Ceylonpinar, Turkey.

The same smut species was also detected on Bromus marginatus Nees., SCS-5859, seed obtained from Pullman, Washington, and on Bromus arvensis L. M1-4871, A-99.

2. Ustilago crameri Koern. on Setaria italica (L.) Beauv., seed introduced from India, P.I. 271609. All seed was destroyed and no attempt will be made to produce disease free seed.

3. Yellow dwarf virus on Allium sp., P.I. 252051, imported from Iran.

A new weed for the United States, Aethionema sp., imported by seed of Brassica sp., P.I. 269448 from West Pakistan was eliminated.

(7) Woody Ornamentals Program

(a) Plant Distribution. Eight accessions of trees and shrubs were available for spring distribution to regional trial plantings. Cooperators in 13 states requested and received 712 plants for trial at 33 sites. Two of the items for 1961 trial were vegetatively propagated. These include the Maney Juniper, furnished by the Horticulture Department, Iowa State University, and the columnar type Siberian elm hybrid. Bud wood of the elm was supplied by the ARS-CRD, Northern Great Plains Field Station, Mandan, North Dakota, through the courtesy of Superintendent E. J. George. The remaining six items were grown from seed.

Cooperators requested and received 45 plants as replacements.

(b) Regional Trial Performance Reports. Cooperator evaluations of the performance of 30 trees and shrubs, planted five years or more than 20 trial sites in eight states were summarized in report form for distribution to cooperating workers in ornamental horticulture. These reports include 13 deciduous trees, 16 deciduous shrubs and one broad leaf evergreen shrub. This summary was published in mimeograph form and is listed as one of the publications issued by the North Central Regional Station in Part 6, item a (4) of this annual report.

Shrubs

The broad leaf evergreen, Berberis juliana, from Central China, and considered to be the hardiest evergreen barberry, did not prove successful for the 23 sites on which it was planted. Out of 81 plants only 12 were living at the end of five years. None of these was considered reliably hardy by the cooperators.

Of 71 Japanese Snowbell plants, Styrax japonica, only two plants were found to be hardy and growing normally - one at Lincoln, Nebraska, and one at East Lansing, Michigan. It is hoped that further testing of these hardy plants, vegetatively propagated, may lead to the successful use of this shrub over a larger portion of the north central region.

The trial planting experience with the shrubby St. Johnswort noted three successful plantings, five plantings with partial survival and 16 plantings which failed entirely. In addition, evidence of lack in winter hardiness was also noted. This plant, a native of the region, apparently is difficult to handle.

Trial plantings of the pygmy caragana, gray dogwood, hedge cotoneaster, winterberry euonymus, white belle honeysuckle, dwarf ninebark, skunk brush sumac, Hansa hybrid rugosa rose, Altai shrub rose, Boulder raspberry, bridal wreath and nannyberry did well over a large part of the region.

The cranberry cotoneaster and the Lemoine Deutzia failed at seven and eight trial sites, respectively. Each shrub was successfully established on six trial sites. Additional plantings of both these shrubs will be needed for a better understanding of their adaptation in the region.

Trees

Five year reports on the performance of the London Plane tree suggest that its usefulness in the Region is limited to the Ohio Valley and Lake Erie shore. Plants which lived were apparently from the root (Sycamore) and not from the bud (London Plane).

The False Lombardy Poplar trial planting reports suggest its use for windbreak purposes over a large part of the region.

Although the valuable disease tolerant Christine Buisman elm was introduced into the United States more than 20 years ago, little is known about its adaptation except it is "not hardy in the north". Five year regional trial reports show successful plantings east of the Missouri River in South Dakota, in southern Wisconsin, in southern Michigan, central Iowa, central Kansas and central and western Nebraska. In southern Minnesota severe summer drought and a dry winter killed 15-foot trees in the Twin Cities area, while plants at Waseca and Morris grew throughout the five year trial.

Two selections of the Siberian elm known to possess unusual hardiness, originally from Harbin, Manchuria, were planted for comparison with the run of the mill Siberian elm widely used in the region. To date no marked differences in hardiness have become evident, however, no severe (early or late) storms occurred during the reporting period.

The trial plantings of the Amur maple were generally satisfactory over all but the southwestern part of the region. The plants at the Crookston, Minnesota, trial were weakened and finally died following chlorosis from highly calcareous soil.

No exceptionally hardy plant of Red bud has been found to date in the test plantings. The work with this ornamental small tree will be continued in an effort to locate and propagate hardy individuals for testing and use beyond its natural range.

It will be noted that certain species under trial, *Acer ginnala*, *Spiraea Van houtte*, *Caragana pygmaea*, *Cotoneaster lucida*, for example, have been introduced to parts of the North Central region for nearly 70 years. Despite references to the use of these ornamentals and others over the years in experiment station bulletins, the available information is fragmentary and lacking in detail. Whether viewed from the standpoint of local problem areas within a given state, or from a general interstate viewpoint, a dearth of information was evident. Contemporary ornamental specialists organized as a sub-committee within the framework of Regional Project NC-7, indicated in 1954 that they wanted to test old introductions as well as the recent products of explorations, breeding and selection.

(8) Proposed greenhouse addition. With assistance from the NC-7 Technical Committee, a request was made to the North Central Directors for funds to assist with the construction of an addition to the present Plant Introduction greenhouse, to be used primarily for plant pathology work. A portion of the funds requested was granted for the fiscal year 1962. Plans for starting construction are under way. The greenhouse will have one large open area and four small isolation compartments.

(9) Public Relations. During the year, the Coordinator and Horticulturist participated separately in several local television and radio programs. In March, a video tape concerning Plant Introduction was prepared for a 30 minute television program for broadcast in April. This was one of a series of 13 prepared and broadcast by the Iowa State University Television station in a series called "Expedition." The purpose of the series was to present to the public interesting facts and stories about science projects underway at Iowa State. The Plant Introduction program was called "Green Gold" and the Coordinator was principal guest and presented the discussion along with the host for the series. Various props were used to help develop stories portraying the history of plant introduction, the movement of plants around the world, its importance to the people of this country and some modern concepts like the introduction of new plants for industrial use.

In October, the Coordinator participated in two brief tape interviews which were broadcast on the local Iowa State University "Farm Facts" radio program. This concerned the work and objectives of the NC-7 Regional program and how the public eventually receives benefit from the work. The Horticulturist participated in a third interview which concerned the ornamental program.

During the year, the Coordinator was interviewed for stories by a reporter from a newspaper in northeast Iowa. Another interview was made for a story in the Wall Street Journal by a reporter from that newspaper.

The Regional Station was host to about 150 visitors during 1961. Included in that group were representatives from private interests, State and Federal representatives, various ISU class bodies, and foreign visitors. The foreign visitors in 1961 were here in 2 groups, both from Russia. The first group consisted of the corn specialist I. Emelianov and his associate. In the second group were 3 members of a Russian Exchange team led by a representative of the USDA.

b. Domestic Exploration in North Central Region

Through financial assistance from the New Crops Research Branch, domestic exploration for native small fruits in Alaska was continued. Approximately 20 items were collected in 1961, mainly in coastal Alaska where a greater variety of small species are found than in the interior of Alaska.

The coastal region from Seward, Valdej, Cordova, Yakutat to Juneau was surveyed and collected in June, 1961. Collections were also made in Arctic Alaska, North of the Brooks Range.

A continuation of this work is planned for 1962.

c. Evaluation of New Crops for Industrial Utilization

In 1961, the NC-7 project continued its participation in the evaluation and seed increase of new crops having possible industrial use as sources of oils, waxes, proteins and fiber. This research and evaluation is closely cooperative among project leaders of several state experiment stations, New Crops Research Branch, USDA-ARS, 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 states.

(1) Regional Cooperative Evaluation Work. With the assistance of funds provided through NC-7 seed contract agreements, the same 5 states participated in making the 1961 evaluations as in previous years. These states are Indiana, Iowa, Kansas, Minnesota, and Missouri. The New Crops Research Branch participates by coordinating the work of NC-7 with similar work being done by others. The Branch headquarters recommends crops for which seed and evaluations are needed and supplies the seed for planting, when needed. Seed and plant material increases are sent to the Northern Utilization Laboratory for analysis.

In 1961 there was greater emphasis placed on pulp crops and consequently more species were evaluated than in previous years. Also, larger plantings were made to provide larger quantities of pulping material for analysis.

(2) Results of 1960 evaluations. Since the 1961 evaluation data from all locations is not available for summary at this time, a statement of results for the 1960 season is presented.

Analytical data in a report from the Northern Utilization Laboratory is presented in Appendix E. The erucic acid oil content of Crambe abyssinica is high, compared with Brassica and Eruca species. It is also high in total oil content. It did not, however, yield as much seed as many of the Brassics. The consistently high yielders are B. compestris var. Rapido II and B. napus var. Golden.

Yield data for the 1960 evaluations is provided in Appendix D.

It may be of interest to note that Foeniculum vulgare made the best yields in the southern part of the region, Kansas and Missouri.

Perilla frutescens trials were made at several locations in Nebraska and first year observations indicate that the crop appears to be well adapted to climatic conditions over a wide area of southern Nebraska but seed shattering is a major limiting factor.

d. National Coordinating Committee Meeting

The meeting of the National Committee was held at Longwood Gardens, Kennett Square, Pennsylvania, May 18 and 19, 1961. This meeting was attended by the coordinator.

e. Revision of NC-7 Project Outline

At the 1961 meeting of the NC-7 Technical Committee a revision of the NC-7 Project Outline was approved. Concurrently, a revision of all state contributing projects which receive support from NC-7 are also being revised.

f. Inventory for National Repository for Clonally Propagated Material

This inventory, begun in 1960, was continued in 1961. Action at the National Coordinating Committee meeting set a deadline for the completion of the inventory as December 31, 1961. Nearly all cards from the North Central Region were received by that date and forwarded to Beltsville for summary.

g. Evaluation Program

(1) Regional Cooperative Effort. Plant introductions are evaluated by crops workers who obtain material for their use. Reports are required and are received at the Regional Station where they are summarized and disseminated to crops workers in various ways, including special reports, annual reports, annual seed lists, and other publications. These summaries are prepared from information received in accession performance reports submitted by cooperators, progress reports on state contributing projects, seed contract evaluations and observational notes taken at the Regional Station.

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

(2) State contributing projects. In 1961, the NC-7 Regional Project provided funds to assist 13 state contributing projects. On June 30, 1961, support was terminated for 3 projects, one each at Kansas, North Dakota and Wisconsin. A list of active and terminated projects is provided in Appendix A.

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

(a) Alaska. "Evaluation of small fruits indigenous to Alaska." A demand exists for useful genes, especially for hardiness and earliness improvement of small fruit. Through funds from other sources, the collection of indigenous fruits began in 1960 and continued in 1961 in the Yukon and Kushokwim River Valleys, southeastern Alaska, Point Barrow, Copper River and McKinley Park areas.

Principally, the work in 1961 consisted of establishing the collected material. Approximately 60 items were collected in 1960. About 20 were collected in 1961 and an extensive exploration into southeastern Alaska is planned in May and June, 1962.

(b) Illinois. "Evaluation of Trifolium, Lotus, Melilotus and Dactylis Introductions."

Trifolium. 35 new T. pratense introductions were established for 1962 evaluation.

Lotus. 136 outstanding 4-year old plants of L. corniculatus were cloned from 28 different plant introductions. The 7 predominantly represented introductions are: PI's 213566, 225115, 226796, 226797, 226798, 228233, and 230190. Several introductions (not listed) show considerable resistance to leafhoppers.

PI 229569, L. tenuis, appears to be highly resistant to leafhoppers as well as possessing considerable vigor.

The selected Lotus clones also appear to be excellent material for root rot resistance and other desirable agronomic characteristics.

Melilotus. In a test for weed competition, none of the introductions of annual Melilotus competed as well as the check varieties, Hubam and Floranna. Israel (PI 200355), an annual type M. alba was also more vigorous than the annual introductions.

Dactylis. 25 outstanding plants were selected from a 5-year old planting of introductions for replicated Clonal evaluation and seed production for progeny testing. 38 2-year old Dactylis accessions are now being evaluated.

(c) Indiana. "Evaluation of legume and grass introductions."

Medicago. Eighty-three plants showing superior vigor, leafhopper resistance and blackstem resistance were selected from the 1958 nursery. These will be made available to other alfalfa breeders. S₁ progenies will be tested for vigor and reaction to diseases and insects.

Thirty open-pollinated progenies from 67 plant introductions will be evaluated for agronomic characters and disease and insect reactions.

Dactylis. About 150 introductions are being established for evaluation.

Phalaris. Selections were made from the 1958 nursery for entry into diallel crossing blocks for evaluation of self and cross fertility as well as palatability by grazing sheep.

(d) Kansas. "Evaluation of Native Grasses." The collection and preliminary evaluation of native species potentially as forage plants has resulted in the selection of materials useful in the grass breeding program and in a few outstanding lines held for increase directly from the evaluation nurseries themselves. Work along this line continues. The following examples are listed:

Panicum virgatum, line 2218 from a collection made at Ada, Oklahoma by the SCS. This line has been exceptionally leafy, vigorous, and free of disease. SCS tests show that it has withstood inundation well. It is a prolific seeder and gives excellent seedlings, so it can be increased rapidly.

Sorghastrum nutans. A composite now under increase and limited use in SCS plantings. This line originated from a 51 accession isolation planting from the 1953 native grass collection.

(e) Kansas. "Evaluation of legumes, native and introduced, other than alfalfa." Native and introduced species were planted in tests for comparison with common legumes like alfalfa and red clover. Yield tests, germination and stand establishment data were obtained. Data is not yet available.

Regional support for this project was terminated June 30, 1961.

(f) Minnesota. "Preservation and evaluation of stone fruits." A collection of about 500 species, cultivars and experimental material is being maintained for testing varieties and selections where comparisons are made each season with respect to hardiness, disease resistance, fruit characters and other qualities. Descriptions, data, and photographs are being assembled for a future Regional Publication. Propagating material is available on request.

(g) Missouri. "Evaluation of Lotus corniculatus for resistance to root and crown rot." Seedlings of 59 introductions were established in 1960 for evaluation on soil heavily infested with the natural disease organisms. Inoculation treatment, in 1960, consisted merely of wounding versus no wounding of the root. This treatment stimulated rapid disease development in 1961 and as of mid summer, wide variations in susceptibility and resistance were noted. At that time 3 or more accessions appeared to be superior in tolerance to commercial European or Empire.

(h) Nebraska. "Preservation of alfalfa clones and preliminary evaluation of plant introductions." Of the 1961 data obtained, leafhopper and spotted alfalfa aphid resistance were the most significant. Details of this work are tabulated as Dr. W. R. Kehr's results in the Medicago section of Appendix C.

(i) Nebraska. "Evaluation of Native Grasses." Selections, advanced selections, and evaluations are continuing with wheatgrasses, bromegrasses, bluestems, indiagrass, gramagrass, lovegrass and buffalograss. Selections from 2 wheatgrasses, PI 172691 and 180794, selected for spike type, were placed in isolation nurseries for seed production.

(j) North Dakota. "Preservation of races of Flax Rust." Lines having three resistance genes were grown in the field in 1960 and seed from the field plots was tested for homozygosity for the 3 resistance genes.

Lyophyllized spores have retained their viability for 5 years. This greatly simplifies the maintenance of cultures of the various races and warrants the termination of regional support for this project. NC-7 support was terminated on June 30, 1961.

(k) Ohio. "Evaluation of domestic and wild species of tomatoes." In 1961, 150 new tomato introductions and 6 domestic accessions were planted for screening for disease resistance and classification for horticultural characters. Seed of these accessions will be saved and placed in storage at the Regional Station.

In 1960, 104 new plant introductions and 104 older varieties were grown, screened for disease, classified and the seed placed in storage at Ames in 1961.

The older, or domestic, lines are those which are being replaced by new varieties. They are being collected and increased in the interest of germplasm preservation.

(l) South Dakota. "Preservation of the Hansen Hardy Fruit Collection." In 1958, rootstocks of the sandcherry, Prunus besseyi, were supplied to a nursery in Oklahoma to be used for propagating peaches. A report from that nursery states that a dwarfing influence is provided by this rootstock and that 2-year old trees produced fruit. More extensive studies are underway to determine the value of sandcherry for peach rootstocks.

Four apple varieties have been propagated on 3 different rootstocks. The first fruit was produced in 1961 and there appears to be a marked influence of stock on scion.

(3) "Pay-off Introductions for 1961." On the basis of evaluation reports, it becomes evident that certain introductions have real merit due to disease or insect resistance, various plant characteristics, and other reasons. This germplasm may be used in the release of introductions as varieties either with or without genetic change, or as a contribution to a variety.

A "pay-off" introduction is considered, at this station, as one for which its merits or value has been proven, or generally accepted by crops workers. Criteria for judgement include release as a variety, contribution of germplasm to a variety, general acceptance of a certain characteristic for use in breeding lines, use as a "tool" in plant breeding, and others. Introductions listed in Appendix C of this report are not to be considered as "pay-offs" on the basis of one report only. Many are preliminary reports which, at least for the present, may place the accession in an "interesting" or "promising" category.

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

Zea mays

(a) 186191 - Uruguay. There are several desirable characteristics in this line which have been reported and which have resulted in its use by many plant breeders. It is resistant to Puccinia sorghi and investigations on inheritance are underway. It has heat and drought resistance and attempts are underway to transfer it into lines lacking these characteristics. It is a multiple-eared type which is of interest to certain corn breeders who are looking for good sources of this trait.

(b) 213776 - North Dakota. In 1958 a report from the Northeastern Region described this line to be a red dent corn which yielded a selection which, at picking, breaks above the husk attachment so that the husk remains on the plant and only the bare ear is picked. A 1961 report, also from the Northeast, states that through selfing and selecting, the clean-husking line has been made to breed true and it was found that the clean-husking character is simply inherited.

From the Northeast also comes a report that the same PI number provided a very good restoration gene for the cytoplasmic sterile from Vermont. Corns carrying Vermont cytoplasm X the recovery restorer gave practically complete restoration; whereas corns carrying Texas cytoplasm X the recovery restorer gave no restoration.

This is the variety 'Northwestern Dent' from the Oscar H. Will Seed Company of Mandan, North Dakota. It was collected by Mr. Clark of the National Research Council through the program of collecting, for preservation, old open-pollinated corn varieties and helps emphasize the value in maintaining these old lines that are now practically non-existent.

(c) 217407 - Peru. (Popcorn) Out of more than 1100 accessions screened for resistance to corn blight by A. J. Ullstrup at Purdue, this accession proved to have resistance which was classed as "highly resistant." It proved to be resistant to both Helminthosporium turcicum, and H. maydis. The accession is a small multiple eared popcorn and there were doubts as to whether or not resistance could be transferred without carryover of the undesirable traits also. However, several corn breeders, who are interested in the multiple-eared trait are making attempts to use it in breeding lines for its disease resistance and prolificacy.

In this plant introduction, Dr. A. L. Hooker discovered a new type of resistance to H. turcicum, designated as source B. Results indicate that it is carried by a single dominant gene, which is being added to several corn belt inbred lines to determine the usefulness of this new type of resistance. Ref: Hooker, A. L. 1961. A new type of resistance in corn to Helminthosporium turcicum. Plant Disease Reporter 45: 780-781

(d) 218160 - Arizona. (flour corn) The main attribute of this introduction is its accepted earworm resistance. It has a tight husk, which may contribute some to its earworm resistance. It was used in crosses to transfer the resistant germplasm to standard inbred lines, mainly sweet corn. Plants are very small but ears are large for plant size.

This line was collected on the Navajo Indian Reservation, Arizona at 5300 ft. altitude. It is a soft yellow flour corn used by the Indians for corn meal cakes. It was received at Ames from Mr. Cutler of the National Research Council.

Medicago sativa

220530 - Afghanistan - The presently known value of this line is in its insect resistance. Individual plants were found, by several workers, to have intermediate resistance to the spotted alfalfa aphid and the pea aphid. Selections were made in 1960 and 1961. Also, in 1961, selections with antibiosis resistance to the pea aphid were made. This line is considered to be a dormant type.

Cucumis sativus

220860 - Korea - 'Shogoin' The characteristic of this line, to produce preponderantly female flowers, was observed in the Northeast Region several years ago. A cucumber breeder in the North Central Region took advantage of this characteristic and developed breeding lines and techniques which would control sex of the flowers. His objective was to develop breeding lines for the production of hybrid cucumbers which would eliminate hand pollinations. This work led to the release of the variety 'Sparton Dawn', in 1961, which is an F₁ hybrid of the pickling type. It is the first commercial hybrid with the all-female character and carries resistance to scab and mosaic.

Lycopersicon spp.

(a) 79532 - L. pimpinellifolium - Peru. Germplasm from this line probably contributed more to tomato breeding programs than any other tomato introduction. Introduced in 1929, it is one of the ancestors of many tomato varieties, among them being, Manalucie, Southland, Homestead, Pan America, Manalee, and Kopick. Among the more recent varieties to which it contributed are: Tucker's Forcing (1956), Mosage (1958), Mozark (1958), Tomboy (1960), Indian River (1960) and Glecano (1960).

It is reported to be the origin of immunity to wilt resistance, Alter-naria, Stemphylium and Cladosporium.

(b) 112215 - L. pimpinellifolium - Ecuador. Over the years, this line has contributed resistance to southern bacterial wilt and leaf mold to the varieties Improved Bay State Forcing, Bay State, and Improved Bay State.

(c) 126445 - L. hirsutum - Peru. This line has a varied number of attributes which contributed to several tomato varieties. It contributed to the variety 'Manalucie' which is resistant to Fusarium wilt, Gray leafspot, early blight, and leaf mold. It contributed to the variety 'Indian River' released in 1960. It contributed the character for high provitamin A to variety 'Caro Red.' Recently, it was reported that this line has resistance to an unidentified cyst nematode, tentatively called Horsenettle cyst. It is also being used in mosaic studies.

(d) 126944 - L. peruvianum - Peru. This line carries several valuable characteristics, but available information does not indicate that it had been used in varieties. In 1960, it was reported to carry heterozygous resistance to Verticillium wilt and was considered to be a possible source of gene or genes for this resistance in addition to what is presently available.

It shows resistance to Race 1 strains of Fusarium oxysporum f. lycopersici and Delray isolates and carries resistance to certain species of root knot nematode.

(e) 223309 - L. esc. X L. pimp. - Rhode Island. Reported by the Northeast Region to be crack resistant. This trait was recovered in crosses with Valiant and assigned the number, PI 223311.

Pisum sativum

(a) 140295 - Iran. Specialists in the Northeast Region discovered that this line carries a dominant gene for resistance to pea enation mosaic virus. Three cultivars were released in 1960 by the New York Station which carry the dominant gene from this accession. They are Perfected Freezer, Thomas Laxton and Surprise.

4. USEFULNESS OF FINDINGS: Results obtained through NC-7 cooperative project, through the work done at the Regional Station, at state experiment stations and by private enterprise, are mutually useful to plant breeders and research workers. The exchange of information about the value of certain plant introductions and how they may be utilized in respective breeding programs is beneficial to the workers themselves, and ultimately to the public, through release of 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 characteristics are needed.

The regional evaluation work on promising industrial crops is contributing a great deal to the knowledge of certain species, which is basic in the search for and development of New Crops.

5. WORK PLANNED FOR NEXT YEAR: No major change in the work program is anticipated for 1962. There will be a greater emphasis on indoor plant pathology research when the greenhouse addition is completed.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR

a. Regional Station

- (1) 1960 Seed list of available introductions.
- (2) Annual Reports for NC-7 Technical Committee and the State Experiment Stations Division, including a summary of promising introductions.
- (3) Newspaper and magazine articles which concern station activities (written by reporters from interviews).
- (4) Dodge, A. F. 1961. Five year report on regional plantings of woody ornamental and shelter plants in the North Central region, 1954 to 1960. Loose leaf notebook, North Central Regional Plant Introduction Station, Ames, Iowa. 77 pp., 30 maps.

(5) Leppik, E. E. The genealogy and history of distribution of the Stem Rust, Puccinia graminis. Mycologia, 1961 (in print).

(6) Leppik, E. E. Hosts for plant diseases new for the United States. Dis. Reports of the Reg. Plant Introduction Sta., Ames, Iowa, No. 5, 1961.

(7) Leppik, E. E. The distribution of the downy mildew, Plasmopara halstedii on sunflowers (in manuscript).

(8) Leppik, E. E. Distribution of Alternaria sesami (in manuscript).

b. Michigan

Lockwood, J. L. 1960. Progress and problems in breeding peas resistant to root rots. Quarterly Bulletin of the Michigan Agricultural Experiment Station 43: 358-366.

c. Minnesota

Robinson, R. G. 1960. CDAA, EPTC, amiben, and propazine for weed control in crop species of potential industrial uses. Proceedings North Central Weed Control Conference, page 99.

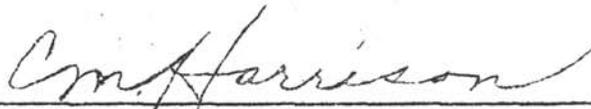
d. Nebraska

Newell, L. C. and S. A. Eberhart. 1961. Clone and progeny evaluation in the improvement of switchgrass, Panicum virgatum L. Nebr. Jour. Series Paper 1017. Crop Science 1: 117-121.

7. APPROVED:

January 19, 1962

Date


Chairman, Technical Committee

January 19, 1962

Date


Regional Administrative Adviser

NC-7 STATE CONTRIBUTING PROJECTS, 1961-62
WHICH RECEIVE ASSISTANCE WITH REGIONAL RESEARCH FUNDS

1. Alaska: The Preservation, Multiplication and Evaluation of Indigenous Alaskan Rubus, Ribes, Vaccinium and Fragaria. Initiated 7/1/60, \$1000 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. Initiated 7/1/56, \$900 annually. Project 890.
4. Kansas: Multiplication, Preservation, and Determination of Potential Value of Forage Grasses and Legumes. Initiated 7/1/49, \$1500 annually as of July 1, 1959. Project 287.
- *5. Kansas: Evaluation of Legumes, Native and Introduced, other than Alfalfa. Initiated 7/1/56, \$500 annually. Project 492.
6. Minnesota: Introduction, Preservation, and Evaluation of Stone Fruits of Probably Potential Value to the North Central Region. Initiated 7/1/50, \$1000 annually. Project 2119 RRF, Hort 2221.
7. Missouri: The Evaluation of Introductions of Lotus corniculatus for resistance to root and crown rot. Initiated 7/1/60, \$600 annually.
8. Nebraska: Preservation of Alfalfa Clones and Seed Stocks Needed in Alfalfa Improvement and Preliminary Evaluation of Plant Introductions. Initiated 7/1/49, \$700 annually. Project 347.
9. Nebraska: The Introduction, Multiplication, Preservation, and Determination of Potential Value of New Accessions and Strains of Native and Exotic Grasses. Initiated 7/1/49, \$1500 annually. Project 348.
- *10. North Dakota: Preservation of Certain Physiologic Races of Flax Rust - Melampsora lini. Initiated 7/1/50, \$500 annually. Project Hatch 13-IR.
11. 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, \$1000 annually. Project Hatch 72.
12. South Dakota: The Collecting, Preserving, Cataloguing, Propagating, and Testing of Fruit Plants having Potential Genetic Value. Initiated 7/1/49, \$2000 annually as of July 1, 1959. Project 174.
- *13. Wisconsin: Reaction of Accessions of Barley (Hordeum spp.) in the World Collection of Small Grains to the Yellow Dwarf Virus. Initiated 7/1/56, \$1000 annually. Project 761.

* Support from NC-7 Regional Project terminated on June 30, 1961.

Inventory and summary of accessions received through 1961

Genera	1960 total cumulative	Removed from in- ventory 1961*	Re- ceived 1961	1961 net cumu- lative	Seed list 1961	** To be in- creased	Packets Dis- tributed
GRASSES AND FIELD CROPS							
Aegilops	120	0	0	120	109	11	34
Agropyron	177	0	8	185	155	30	88
Agrostis	84	1	5	88	72	16	23
Alopecurus	33	0	1	34	24	10	4
Apera	5	0	0	5	5	0	1
Arrhenatherum	11	0	0	11	11	0	10
Bouteloua	3	0	0	3	3	0	6
Bromus	371	14	29	386	366	20	337
Calamagrostis	9	0	1	10	8	2	3
Cynosurus	8	0	0	8	7	1	2
Dactylis	334	0	4	338	256	82	77
Danthonia	4	1	0	3	2	1	0
Echinochloa	18	0	0	18	15	3	22
Elymus	9	0	1	10	5	5	11
Enneapogon	2	2	0	0	-	-	3
Eremopoa	2	0	0	2	0	-	0
Eriachne	1	1	0	0	-	-	-
Euchlaena	3	0	0	3	2	1	7
Festuca	181	1	4	184	132	52	44
Guadiniopsis	1	0	0	1	0	1	-
Glyceria	1	0	0	1	0	1	-
Helictotrichon	6	2	0	4	1	3	2
Henrardia	1	1	0	0	-	-	-
Heterantherium	3	0	0	3	3	0	-
Hordeum	9	1	0	8	7	1	21
Koeleria	7	0	0	7	1	6	0
Lolium	115	0	2	117	114	3	10
Melica	2	0	0	2	0	2	-
Milium	1	1	0	0	-	-	-
Nardus	2	0	0	2	0	2	-
Neurachne	1	0	0	1	0	1	-
Panicum	168	1	0	167	146	21	140
Pennisetum	1	0	0	1	1	0	1
Phacelurus	1	0	0	1	1	0	0
Phalaris	60	1	2	61	51	10	43
Phleum	47	0	0	47	43	4	31
Poa	51	1	0	50	46	4	37
Polypogon	1	0	0	1	1	0	-
Pringlea	2	2	0	0	-	-	-
Puccinellia	2	0	0	2	0	2	0
Rottboellia	1	1	0	0	-	-	0
Schedonnardus	1	0	0	1	1	0	2

* 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	1960 total cumulative	Removed from in- ventory 1961*	Re- ceived 1961	1961 net cumu- lative	Seed list 1961	** To be in- creased	Packets Dis- tributed
GRASSES AND FIELD CROPS, Cont.							
Secale	5	0	0	5	4	1	6
Setaria	88	0	2	90	87	3	59
Sorghum	13	0	0	13	12	1	4
Sporobolus	2	0	0	2	0	2	-
Tricholaena	2	0	0	2	2	0	-
Tridens	1	0	0	1	1	0	2
Tripsacum	1	0	0	1	0	1	0
Trisetum	3	0	1	4	3	1	4
Triticum	1	0	0	1	1	0	1
Zea							
Introductions	1581	6	32	1607	1564	43	
State O.P. Col- lections	<u>223</u>	<u>0</u>	<u>1</u>	<u>224</u>	<u>224</u>	<u>0</u>	
Total Zea	<u>1804</u>	<u>6</u>	<u>33</u>	<u>1831</u>	<u>1788</u>	<u>43</u>	<u>3058</u>
TOTALS: Genera-52	3779	37	93	3835	3486	349	4093
LEGUMES							
Anthyllis	2	0	0	2	0	2	1
Astragalus	37	1	0	36	21	15	36
Coronilla	14	0	2	16	13	3	17
Dalea	5	1	0	4	1	3	5
Desmodium	1	1	0	0	-	-	3
Glycine	4	4	0	0	-	-	2
Lathyrus	89	0	2	91	34	57	59
Lespedeza	1	0	0	1	0	1	1
Listia	1	0	0	1	0	1	1
Lotus	116	0	33	149	139	10	334
Medicago	536	3	21	554	515	39	335
Melilotus	171	3	0	168	159	9	119
Onobrychis	47	0	0	47	26	21	13
Psoralea	10	0	0	10	3	7	10
Scorpiurus	7	0	0	7	7	0	8
Tetragonolobus	3	0	0	3	2	1	6
Trifolium	428	2	8	434	369	65	152
Trigonella	130	0	1	131	91	40	36
TOTALS: Genera-18	1602	15	67	1654	1380	274	1138
FRUITS AND VEGETABLES							
Allium	262	30	32	264	110	1154	139
Apium	56	0	0	56	52	4	49
Asparagus	22	1	18	39	7	32	24
Beta	275	4	9	280	250	30	272
Citrullus	0	2	2	0	-	-	-
Cucumis	409	2	13	420	380	40	438
Cucurbita	492	38	11	465	375	90	1114

Genera	1960 total cumulative	Removed from in- ventory 1961*	Re- ceived 1961	1961 net cumu- lative	Seed list 1961	** To be in- creased	Packets Dis- tributed
FRUITS AND VEGETABLES, Cont.							
Daucus	216	4	21	233	137	96	118
Lactuca	201	7	91	285	193	92	81
Luffa	3	0	0	3	0	3	0
Lycopersicon	1608	1	710	2317	1670	647	7730
Phaseolus	36	0	0	36	0	36	0
Pisum	1016	1	120	1135	963	172	726
Prunus	1	0	0	1	1	0	-
Pyrus	2	0	0	2	2	0	-
Rheum	7	0	0	7	1	6	1
Rubus	83	0	0	83	83	0	38
Solanum	0	0	1	1	0	1	1
Spinacia	170	0	26	196	169	27	232
Vaccinium	5	0	0	5	3	2	2
TOTALS: Genera-20	4864	90	1054	5828	4396	1432	10965
ORNAMENTAL, OIL AND SPECIAL							
Group I. Oil and Special							
Brassica	399	57	22	364	257	107	689
Camelina	2	0	0	2	0	2	-
Chenopodium	1	0	0	1	0	1	-
Crambe	1	0	0	1	1	0	1
Cyamopsis	5	0	0	5	0	5	-
Cynara	2	0	0	2	0	2	-
Dimorphotheca	1	0	0	1	0	1	2
Eruca	32	0	0	32	32	0	42
Guizotia	1	0	0	1	0	1	-
Helianthus annuus	220	0	1	221	221	0	184
Helianthus spp.	4	0	2	6	5	1	7
Lallemantia	2	0	0	2	0	2	-
Mentha	11	0	0	11	7	4	0
Ononis	3	0	0	3	2	1	9
Perilla	11	0	0	11	9	2	8
Raphanus	5	0	0	5	5	0	2
Ricinus	10	0	0	10	0	10	0
Satureja	5	0	0	5	0	5	-
Sesamum	5	0	0	5	0	5	-
Symphytum	1	0	0	1	1	0	0
Oil and Pulp Crops evaluated through con- tract with NC-7, 1961							220
TOTALS: Genera-20	721	57	25	689	540	149	1164

Group II. Herbaceous and Woody Ornamentals

Genera	1960 Carry Over	Dropped# in 1961	Added in 1961	Net 1961	Use## in Program	Plants Dis- tributed 1961
PI Abelia	1	0	0	1	G	0
Acanthopanax	1	0	0	1	P	0
Acer (2 PI)	6	1	0	5	G	4
PI Agapetes	1	1	0	0	O	0
Albizzia	1	1	0	0	D	75
PI Ammocharis	1	1	0	0	O	0
Amorpha	2	0	0	2	G	0
PI Aragyris	1	0	0	1	G	0
Berberis	3	1	0	2	DG	113
PI Betula	3	0	0	3	G	0
PI Berchemia	1	1	0	0	O	0
PI Brachycome	1	1	0	0	O	0
Buxus (1 PI)	1	0	1	2	G	0
Caragana	3	0	0	3	G	4
PI Carpinus	1	0	0	1	G	0
Ceanothus	1	0	0	1	G	0
Cedrus	1	1	0	0	O	0
PI Chrysanthemum	113	46	0	67	G	10
PI Cissus	1	1	0	0	O	0
PI Coleus	23	1	0	22	G	0
Cornus (1 PI)	3	0	0	3	GP	0
Cotoneaster(1 PI)	2	2	0	0	O	19
PI Cydonia	1	1	0	0	O	0
PI Elaeagnus	1	1	0	0	O	0
Elsholtzia	1	0	0	1	H	0
Eucommia	1	0	0	1	D	79
Euonymus (1 PI)	6	0	0	6	GH	9
PI Euphorbia	1	0	0	1	G	0
Forsythia	1	0	0	1	H	0
Fraxinus	2	2	0	0	O	0
PI Hedera	0	0	1	1	G	0
Hovenia	1	0	0	1	D	72
PI Hydrangea	1	1	0	0	O	0
Hypericum	1	0	0	1	H	0
Indigofera	1	0	0	1	D	83
PI Ilex	1	1	4	4	G	0
PI Iris	1	0	0	1	G	0
PI Ixia	1	0	0	1	G	0
Juniperus	0	0	1	1	D	103
PI Kohleria	0	0	1	1	G	0
Larix	1	0	0	1	G	0
PI Ligustrum	2	2	0	0	O	0
Lonicera	2	0	0	2	G	0

Failed to survive summer or winter conditions, or all plants distributed, Populus accessions destroyed.

D-Plants distributed to Regional Trials, G-Growing at Regional Station, H-Holding (distributed previously), P-Under Propagation.

Genera	1960 Carry Over	Dropped# in 1961	Added in 1961	Net 1961	Use## in Program	Plants Dis- tributed 1961
<u>Group II. Herbaceous and Woody Ornamentals, Cont.</u>						
PI Magnolia	2	2	0	0	0	0
PI Malus	2	0	0	2	H	0
PI Melicope	1	1	0	0	0	0
PI Morus	1	0	0	1	H	0
PI Molinia	1	1	0	0	0	0
PI Olearia	0	1	1	0	0	0
Pachystima	1	0	1	2	HP	0
PI Passiflora	1	0	0	1	G	0
PI Penstemon	1	1	0	0	0	0
PI Philadelphus	2	0	0	2	G	0
Photinia (1 PI)	2	0	0	2	G	0
PI Picea	0	0	1	1	G	0
PI Pinus	1	0	2	3	G	0
PI Populus	7	7	0	0	0	0
PI Potentilla	0	3	4	1	G	0
PI Pyrus	1	0	0	1	D	94
PI Quercus	1	0	0	1	G	0
PI Rhododendron	3	0	3	6	G	0
Ribes	1	0	0	1	G	0
PI Rosa	6	0	0	6	G	0
Rubus	1	0	0	1	H	0
Salix	2	0	0	2	H	0
PI Salmia	0	0	1	1	G	0
Securinega	1	0	0	1	H	0
PI Shepherdia	2	0	0	2	H	0
PI Sorbus	1	0	0	1	G	0
PI Strobilanthes	0	0	1	1	G	0
PI Syringa	1	0	0	1	G	0
PI Thuja	1	0	0	1	G	0
PI Tilia	1	1	0	0	0	0
Ulmus	0	0	2	2	D	102
TOTALS: Genera-75	243	83	24	185		767

NORTH CENTRAL REGIONAL
PLANT INTRODUCTION STATION
Ames, Iowa

Appendix C to Project NC-7 Annual Report for 1961

PROMISING PLANT INTRODUCTIONS FOR 1961

Through the cooperation of crops workers who received and evaluated plant introductions from this station, we receive evaluation reports on materials tested. These reports are herein summarized. Information on lines showing interesting or promising traits or characteristics, unusual characteristics, etc. is included.

Most of the information listed below is provided by crops workers. However, notes on agronomic and horticultural characteristics are made annually at the Regional Station on introductions grown for seed increase. Those lines which appear to have unusually good appearance in the nursery row are summarized in Part A, Regional Station Observations. Part B, Cooperator Evaluations summarizes information received from crops workers in the North Central Region, as well as other regions.

Most of the results are preliminary and should be considered as such. However, crops workers are encouraged to use them for further evaluation. They are also encouraged to use materials listed in the annual Seed List. One requisite for using this seed is that evaluation reports be submitted on the performance of the material used.

A. Regional Station Observations

1. GRASSES

a. Agropyron spp.

- 174011 - A. intermedium - Turkey - An overall good appearing and desirable line - leafy, has good fall recovery, especially the second year, hardy, vigorous, uniform, and medium seedling vigor, but susceptible to crown rust.
- 206259 - A. trichophorum - Turkey - A very desirable appearing line, having good hardiness, showing no winter injury, good fall recovery, especially the second year, strong seedling vigor, leafy, and medium uniformity. Somewhat susceptible to crown rust.
- 206618 - A. intermedium - Turkey - A desirable appearing line similar to PI 174011, but very susceptible to crown rust.
- 203062 - A. sp. - Turkey - hardy, vigorous, very leafy, good fall recovery in second year (better than during 1st), good seed producer, spreads quite vigorously, but very susceptible to crown rust.
- 240129 - A. intermedium - Iran - Has very good appearance, leafy, vigorous spreader, hardy, uniform, good fall recovery, good seedling vigor, medium seed producer, but susceptible to crown rust.
- 249142 - A. cristatum - Portugal - Looked good in the 1962-61 planting during both seedling and 2nd years growth - completely hardy, uniform, showed no winter injury after a rather severe winter, good fall recovery in 1st and 2nd years, strong seedling vigor, and leafy. This accession also looked good in the 1959-60 planting. Has varying degrees of susceptibility to crown rust from low to moderate.

- 249144 - A. elongatum - Portugal - A very good appearing line during 1st and 2nd year growth in the 1960-61 planting - leafy, vigorous, completely hardy, showed no winter injury, uniform, excellent fall recovery both years, strong seedling vigor and good seeder. Also looked good in the 1959-60 planting. Relatively resistant to rust.
- 249145 - A. intermedium - Portugal - In the 1960-61 planting this was a desirable appearing line, uniform, good fall recovery both years, leafy, good seedling vigor, hardy (21 of 22 plants survived winter with no winter injury), good seeder. It also looked good in the 1959-60 planting. Quite resistant to rust.
- 249146 - A. trichophorum - Portugal - In 1960-61 planting it appears to be quite desirable - completely hardy with no winter injury, good fall recovery both years, good seedling vigor, fairly leafy. Also looked good in the 1959-60 planting. Somewhat resistant to rust.
- 250910 - A. cristatum - Iran - In the 1960-61 planting, this accession looks very good, it is hardy, uniform, is a heavy seeder, has fine leaves, good to medium fall recovery. It is not quite as good as PI 249142. It also looked good in the 1959-60 planting. Somewhat resistant to rust.
- 251443 - A. elongatum - Turkey - This accession looked good during both years, 1960 and 1961 due to its leafiness, vigor, and good fall recovery. In the 1959-60 planting it showed complete winterhardiness but in the 1960-61 planting (due to a more severe winter) 23 of 25 plants survived and there was some apparent winter injury. No rust observed.
- 253430 - A. intermedium - Yugoslavia - This line had a very desirable appearance in both the 1959-60 and 1960-61 plantings due to its leafiness, vigor, good color, uniformity, and good fall recovery. It was completely hardy in both plantings with no winter injury. No rust observed.
- 255143 - A. cristatum - Turkey - Had excellent appearance in the 1959-60 and 1960-61 plantings due to its vigor, leafiness, color, fine leaves and good to medium fall recovery. It had many heads and was completely hardy with no winter injury. Some crown rust infection was noted.
- 255144 - A. cristatum - Turkey - A good looking line, very similar in appearance and performance to 255143 for the 1959-60 and 1960-61 plantings. Also had some crown rust.
- 255145 - A. cristatum - Turkey - Similar to 255144 but with slightly more crown rust.
- 255148 - A. elongatum - Turkey - Had a good appearance in the 1959-60 and 1960-61 plantings. It has relatively fine leaves, good vigor, good fall recovery, leafy and was completely winterhardy in both plantings with no winter injury. No rust was observed.
- 261098 - A. intermedium - Spain - This was grown for the first time in the 1960-61 planting and was a rather attractive line both years due to its leafiness, green color and vigor. It was completely winterhardy with practically no winter injury. However, it is not considered quite as good as others grown in this planting. It had slightly less fall recovery. No rust was observed.

261099 - A. obtusinaculum - Spain - This species was grown for the first time in the 1960-61 planting and appeared to be as attractive as the better lines grown. For both seasons, it was consistent in its leafiness, vigor, good green color and good fall recovery. It was almost completely winterhardy, 24 of 25 plants survived and only negligible winter damage was apparent. No rust was observed.

b. Agrostis spp.

- 251524 - A. alba - Yugoslavia - On the basis of the 1959-60 planting, this line was reported to be vigorous, hardy, with good spring appearance (See App. C, 1960 Annual Report). This same observation was made in the 1960-61 planting, plus the fact that it seeded quite heavily. It survived the winter 100% and showed no winter damage. However, it makes its best performance in the spring, while fall recovery, and appearance is only mediocre. It is very susceptible to stem and crown rust in the fall.
- 251568 - A. alba - Yugoslavia - Performance was the same as for 251524 for both plantings, including disease susceptibility.
- 251569 - A. alba - Yugoslavia - Spring performance and hardiness was the same as for 251524, but fall performance was considerably better. There was better fall recovery and it grew quite actively in the fall. Quite susceptible to stem rust, but slightly less crown rust.
- 251945 - A. palustris - Austria - This was previously reported as A. alba (App. C, 1960 Annual Report), but was since reidentified. It continued to have a good spring appearance in the 1960-61 planting, as first noted in 1959-60. However, it was injured some by disease during 1961. This is a coarse type of bent-grass. It produced very little seed in the 1959-60 planting and none in the 1960-61 planting. Although it was still growing well at the end of the 1961 season. This is a turf type grass. Moderately susceptible to stem rust.
- 252045 - A. tenuis - Italy - Previously reported as A. sp., but was later identified. This is a rather desirable turf line, being leafy, green, vigorous, makes good fall growth and has many fine leaves. It seeds well, is hardy, showing only slight winter injury, which is quickly overcome. This is a relatively good seeder. Moderately susceptible to stem rust.

c. Alopecurus spp.

- 251380 - A. pratensis - Iran - This accession is unusual because of its exceptionally strong rhizome development, causing it to spread quite vigorously. It was grown in 1959-60 and again in 1960-61. This characteristic was observed in both plantings. Also it was consistent in both plantings for its leafiness, good vigor, good fall recovery, uniformity and general all round good appearance. It was completely hardy with no winter damage. However, the seed tends to shatter rather easily. It appears quite susceptible to stem and crown rust, but evidently overcomes this weakness because of its vigor.

- 251525 - A. pratensis - Yugoslavia - This line has weak rhizomes, but is interesting because of its overall good appearance due to its vigor, leafiness, dark green color, and good fall recovery. It is completely hardy (consistently in the 1959-60 and 1960-61 plantings) with no apparent winter damage. Moderately susceptible to stem rust.
- 258741 - A. pratensis - U.S.S.R. - This line has weak rhizomes and has a moderately good appearance, but does not equal that of 251525, probably because of having less fall recovery. However, it possesses winterhardiness similar to these two lines. It is more susceptible to stem rust than the two lines listed above.
- 258742 - A. pratensis - U.S.S.R. - This was grown for the first time in 1960-61. It had better overall appearance in 1960 than 1961. It showed less hardiness, 23 of 25 plants survived the winter, and had less fall recovery in 1961 than other lines. Weakly rhizomatous. Shows more rust resistance than the other three lines above.
- 260243 - A. pratensis - Germany - Grown for first time in 1960-61. Has very good over-all appearance, uniform, vigorous, including good seedling vigor, leafy, and good spring and fall recovery. It was completely winterhardy and no apparent winter injury.

d. Arrhenatherum spp.

- 251415 - A. elatius - Yugoslavia - This was observed to be a very desirable line in the 1959-60 planting and continues to exhibit these characteristics in the 1960-61 planting. It has good vigor, leafy, good fall recovery, is a good seed producer and was completely hardy with no apparent winter injury.

e. Bromus spp.

- 251105 - B. erectus - Yugoslavia - A good appearing line, observed in the 1959-60 and 1960-61 plantings. Continues to show good color, leafiness, good fall recovery, good winterhardiness and good seeder. Not a top performer, but in the good-medium range. Susceptible to ergot.
- 251106 - B. erectus - Yugoslavia - A good looking accession in the 1959-60 and 1960-61 plantings. Rates as one of the top lines in general appearance, performance and hardiness. Susceptible to ergot.
- 251107 - B. erectus - Yugoslavia - A good looking accession in the 1959-60 and 1960-61 plantings. Rates as one of the top lines in general appearance, performance, and hardiness. Moderately susceptible to ergot.

Several Bromus inermis introductions were received from Poland and the U.S.S.R. which were similar in performance, (generally good) and which compared favorably with the check variety, Fischer. The introductions listed below were grown for the first time in 1960-61. Spring growth was comparable to the check with respect to vigor, leafiness, performance and general appearance. Fall recovery is good to medium but less than

Fischer. All were fully winterhardy with no apparent winter injury. Good seed producers. No rust was observed on these lines in the field plantings.

255870 - B. inermis - Poland	258747 - B. inermis - U.S.S.R.
255871 - B. inermis - Poland	262454 - B. inermis - U.S.S.R.
253743 - B. inermis - U.S.S.R.	262455 - B. inermis - U.S.S.R.
258744 - B. inermis - U.S.S.R.	262456 - B. inermis - U.S.S.R.
258745 - B. inermis - U.S.S.R.	262457 - B. inermis - U.S.S.R.
258746 - B. inermis - U.S.S.R.	

262458 - B. inermis - U.S.S.R. - This line appeared superior to the others and in some respects, to Fischer.

f. Dactylis spp.

- 197178 - D. glomerata - England - This is a vigorous leafy, upright accession that overcome considerable winter injury. 19 of 25 plants in 1960-61 survived but had considerable winter injury. Otherwise it had good vigor, and good fall recovery both years. Shows considerable susceptibility to rust.
- 251112 - D. glomerata - Yugoslavia - Appears to be a good line with considerable winterhardiness. 24 of 25 plants survived 1960-61, with little winter injury. It is vigorous and had medium to good fall recovery. Moderate susceptibility to rust.
- 251815 - D. glomerata - Italy. This line is of interest because of its overall good appearance and "chunky" or "blocky" heads which are very striking. It is fairly hardy, 15 of 16 plants survived 1960-61, but had considerable winter injury. However, due to plant vigor, this was overcome and the line showed good performance, including good fall recovery. It was very leafy. Moderate infection with rust.
- 255873 - D. glomerata - Poland - An overall good appearing line, quite hardy, 23 of 25 plants surviving the winter of 1960-61 with a medium amount of winter injury, which, due to its vigor, was rather quickly overcome. It had good fall recovery both years and is quite leafy. Considerable rust infection.
- 257268 - D. glomerata - Sweden - Similar in all respects to 255873. One of the best appearing lines.
- 262459 - D. glomerata - Russia - One of the best lines grown in 1960-61. It was superior in winterhardiness to Potonac and Sterling, showing considerably less winter injury. It is very vigorous leafy, had better fall recovery than the checks and appeared to be equal to or superior than the checks in seed production. Showed considerable susceptibility to rust.
- 262461 - D. glomerata - Russia - Similar to 262459 but had somewhat more winter injury. 24 of 25 plants survived the winter of 1960-61. It is leafy and vigorous and made good fall recovery.

g. Festuca spp.

- 251138 - F. rubra var. heterophylla - Yugoslavia - Appeared to be a very desirable line in the 1959-60 and 1960-61 plantings. It is quite vigorous, made good fall growth and all plants survived the winter, some showing injury in 1960-61 but not in 1959-60. Should be evaluated for possible turf use. No disease observed in field.
- 251824 - F. rubra - Italy - Very similar to 251138 - has good appearance and may be useful for turf. No disease observed.
- 253308 - F. rubra - Yugoslavia - Besides generally looking good, this line is of interest because of its strongly rhizomatous growth habit - more so than most other F. rubras in the planting. It is vigorous, very green, made excellent fall growth, leafy with fine leaves, and quite hardy. All plants survived 1960-61 with only slight winter injury, which was quickly overcome. Should be evaluated for possible turf use. No disease observed.
- 255469 - F. rubra - Yugoslavia - This is another exceptional line very similar to 253308, but having less winter injury. It is strongly rhizomatous, aggressive, leafy and produces good fall growth. Should be evaluated for possible turf use. No disease observed.
- 255879 - F. rubra - Poland - Moderate rhizome development, hardy, with practically no winter injury, but less vigor and fall growth than 253308. Merits further evaluation for turf use. No disease observed.
- 255880 - F. rubra - Poland - Bunchy with little rhizome activity. Quite a good line but a little short on appearance and fall growth. Merits further evaluation for turf. No disease observed.

h. Phalaris spp.

- 225116 - P. arundinacea - Germany - Grown in 1959-60 and 1960-61 plantings. In both plantings it exhibited very vigorous growth and spread, strong rhizomes development, good hardiness each year. However, it has very wide leaves. No disease observed.
- 235023 - P. arundinacea - Germany - Grown in 1959-60 and 1960-61. Very vigorous in both plantings and an all-round good appearing line, very leafy. Has narrow leaves and is hardy. No disease observed.
- 255887 - P. arundinacea - Poland - A good line - hardy, vigorous, medium wide leaves, making strong growth during the first and second seasons. No disease observed.

i. Poa spp.

- 229718 - P. pratense - Iran - A good strong line, hardy and vigorous sod former. Very susceptible to rust.
- 229721 - P. pratense - Iran - A good strong line, hardy and vigorous sod former but susceptible to rust.
- 229777 - P. pratense - Iran - A good strong line, hardy and vigorous sod former but was heavily infected with rust.
- 235488 - P. pratense - Switzerland - A good strong line, vigorous, good sod former, no winter injury - fairly leafy. Heavy rust.

- 241068 - P. pratense - Oregon - A very good appearing line. No winter injury, good fall growth and color, vigorous, and leafy. A good sod former. Heavy rust.

j. Zea mays

- 186225 - Australia - Stiff stalk, good root system, silks emerge later than pollen. Husk extends 10 inches beyond ear.
267176 - Russia - Has long tight, pointed husk that extends 4-5 inches beyond end of ear.

2. LEGUMES

- a. Lotus spp.- A considerable number of Lotus introductions were grown in the 1960-61 planting, many of which were grown for the first time at Ames. Lotus check varieties used in the planting were Empire, Granger, and Viking. Empire did not perform very well, while Granger and Viking looked fairly good. No disease was observed on any lines. Several introductions which appeared to be as good or better in general appearance, size and vigor than Granger or Viking are listed as follows:

- 228150 - L. corniculatus - Russia - This one was previously reported. It is consistent in its good performance, hardiness and is as good or better than the check varieties.
233807 - L. corniculatus - Italy - Comparable to Granger and Viking. Fall recovery is leafy and vigorous. It is not as hardy as other accessions grown in 1960-61; 19 of 21 plants survived the winter with moderate apparent winter injury. Due to its vigor, this was overcome early in the season.
234786 - L. corniculatus - Sweden - Previously reported in the 1959 annual report for the 1958-59 planting. Performance in the 1960-61 planting was also good, being comparable to Viking and Granger. It is hardy and its fall recovery was vigorous and leafy.
237278 - L. corniculatus - Denmark - Similar to PI 234786.
251558 - L. corniculatus - Yugoslavia - A hardy accession having had a very good general appearance both years. It is vigorous, has good fall recovery and is comparable to Granger and Viking.
255302 - L. corniculatus - France - Had good general appearance both years although not quite as good as Granger, Viking or certain other good lines in the 1960-61 planting. It is less hardy, 23 of 25 plants surviving, with moderate winter injury being apparent. However, its general good appearance merits attention.
255303 - L. corniculatus - France - Comparable to Viking and Granger in appearance and performance. All plants survived the winter, but had moderate winter injury.
255304 - L. corniculatus - France - Similar to 255302.
258446 - L. corniculatus - Italy - Similar to 255302.
259512 - L. corniculatus - Czechoslovakia - Similar to 255302, but with more growth and vigor.
259513 - L. corniculatus - Czechoslovakia
259514 - L. corniculatus - Czechoslovakia
FC 32945 - L. corniculatus - Uruguay

- b. Medicago spp.- From the standpoint of general appearance, there were many accessions grown for the first time at Ames in the 1960-61 planting that looked as good or better than the check varieties, Vernal and Ranger. Many of these lines came from Yugoslavia, Poland, Russia, and other adjacent countries. However, when taken as a group, the accessions from U.S.S.R., PI 258750-58, 258761-66, 258817-845; Bulgaria, 259520-24; U.S.S.R., 259525-30; Hungary, 259531-33; Czechoslovakia, 259534-35; Germany, 260246-48 and 262534; and Israel, 262535-50, were very impressive. They were vigorous, their total seasonal growth was large and they made excellent recovery after being cut in mid-August. They all survived the winter of 1960-61 very well, with very few plants being killed. However, there appeared to be varying degrees of winter injury, which due to plant vigor, was overcome early in the season. Seed of all the above listed accessions may not yet be available, but the 1961 seed list will indicate those which are available.

Certain accessions of the above group, and others, which appeared to be particularly impressive in general appearance are listed as follows:

- 258751 - M. falcata - Russia - Fall recovery was tall, open, vigorous and fairly leafy. Appears resistant to common diseases.
- 258754 - M. falcata - Russia - Its appearance in August, prior to cutting, and again in the fall, was quite impressive because of its leafiness, vigor, and large size. This one was considered as being among the best.
- 258763 - M. sativa - Russia - Fall recovery looked very good. Moderately susceptible to leaf spot and rust.
- 258764 - M. sativa - falcata hybrid - Russia - Good vigor and fall recovery. Moderately susceptible to leaf spot but had heavy rust.
- 258839 - M. sativa - falcata hybrid - Russia - Moderate to heavy leaf spot and rust.
- 258845 - M. sativa - Russia - Moderate to heavy leaf spot and rust.
- 259526 - M. sativa - U.S.S.R. - Moderate to heavy leaf spot and rust.
- 260248 - M. sativa - falcata hybrid - Germany - Slight leafspot but heavy rust.
- 262532 - M. falcata - Russia - While insecticide was used in an attempt to control leafhoppers, the treatment was not 100% effective and leafhoppers were present in the 1960-61 planting at least during parts of the season. This accession was especially impressive due to its relative freedom from leafhopper damage as noted in August, prior to being cut. This coincides with one of Dr. Kehr's observations at Nebraska as reported later in this report. Resistant to common diseases.
- 262534 - M. sativa - Czechoslovakia - Moderately susceptible to leaf spot and rust.

c. Melilotus spp.

- 262551 - M. alba - Bulgaria - Had good general appearance during the first year. 22 of 25 plants survived and had medium amount of winter injury. Had very little disease.

263496 - M. alba - Israel - Appears very similar to PI 200355, a biennial type which performs as an annual and was released as the variety "Israel" in Texas in 1958. It blooms over a long period of time, starting in early summer and produces mature seed rather abundantly. Plants mature before the end of the season. Very little disease.

d. Trifolium spp.

- 239975 - T. repens - Algeria - A good vigorous line with good fall growth during the first year, but it is non-hardy at Ames. Ladino type. Only slight leaf spot infection.
- 239977 - T. repens - Portugal - Same as 239975. Ladino type. No disease observed.
- 239982 - T. repens - Iran - A good vigorous line, making good fall growth, hardy, but sustains a medium amount of winter injury. No disease observed.
- 258787 - T. ambiguum - U.S.S.R. - A good vigorous line making considerable fall growth and having very good winterhardiness without showing winter injury. A vigorous spreader. Considerable leaf spot and mildew.
- 258788 - T. ambiguum - U.S.S.R. - Similar to 258787 but did not produce seed during the first nor second year. Considerable leaf spot and mildew.

B. Cooperator Evaluations

1. GRASSES

- a. Aegilops spp.- The following information was provided on resistance to various races of leaf rust:

<u>PI No.</u>	<u>Source</u>	Race:	<u>5</u>	<u>6</u>	<u>9</u>	<u>VI</u>	<u>15</u>	<u>122</u>
116294	Germany		VH	VH	VH	VH	VH	VH
170191	Turkey		MR	VH	VH-S	VH	MR	VH
170192	Turkey		HR	HR	HR	HR	HR	VH
170193	Turkey		VH	S	MR	MR	MR	MR
170196	Turkey		VH	VH	VH	VH	VH	VH
170197	Turkey		HR	HR	MR	HR	VH	HR
170203	Turkey		VH	VH	VH	VH	VH	VH
172358	Turkey		MR	VH	S	S	VH	HR
219863	Iraq		MR	MR	HR	MR	MR	S
220327	Afghan.		HR	HR	MR	HR	VH	MR
221899	Afghan.		HR	VH	MR	VH	VH	HR
226615	Iran		S	S	MR-S	HR	S	S
227340	Iran		MR	MR	MR	HR	MR	HR
254862	Iraq		HR	HR	-	VH	HR	-
254865	Iraq		HR	HR	VH	HR	VH	VH

VH = Very highly resistant

HR = Highly resistant

MR = Moderately resistant

S = Susceptible

- E. G. Heyne, Kansas

- b. Agropyron spp.

(1) A. repens

172363 - Turkey - Possible for permanent pasture - rapid spreader, vigorous throughout the growing season. Appears to be more productive than native quackgrass.

- D. Carroll, Michigan

(2) A. cristatum

172691 - Turkey - Fair forage and vigor - hardy.

- R. W. Robertson, Canada

(3) A. intermedium

222961 - Iran - Tall, vigorous and hardy.

- R. W. Robertson, Canada

(4) A. kosanini

237636 - Turkey - Hardy, late and leafy. Affected by rust.

- R. W. Robertson, Canada

c. Bromus spp.

- 162779 - B. auleticus - Argentina - Very high yield, excellent aftermath recovery but not quite as good as PI 189612 and 217593, used in the same test.
- 189612 - B. catharticus - South Africa - One of two most promising of a group of about 70 Bromus species tested. The other is 217593. These were retested in solid plots in the summer of 1961 and yielded over 5 tons of D.M. This species appears promising as an annual hay and/or pasture crop. Further testing is being conducted.
- 202359 - B. catharticus - Argentina - Very high yield, excellent aftermath recovery, but not quite as good as PI 189612 and 217593 used in the same test.
- 217593 - B. catharticus - India - See PI 189612. Similar in value.
- 219801 - B. catharticus - Chile - See PI 202359. Similar in value.
- 261527 - B. inermis - Yugoslavia - Good seedling vigor, good mature plant vigor and characteristics and fair aftermath recovery.
- 251631 - B. inermis - U.S.S.R. - See PI 251527. Similar in value.
- 251682 - B. inermis - U.S.S.R. - Good aftermath recovery.
- 251683 - B. riparius - U.S.S.R. - Good aftermath recovery.

- E. E. Gamble, Guelph, Ont., Canada

The following accessions show resistance to Pyrenophora bromi:

- 170258 - B. japonicus - Turkey
- 206551 - B. arvensis - Greece
- 211008 - B. pseudodanthoniae - Afghanistan
- 212246 - B. japonicus - Turkey
- 229527 - B. brachystachys - Iran
- 231760 - B. ciliatus - New Hampshire
- 235612 - B. secalinus - Cyprus

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- 172389 - B. fibrosus - Turkey - Hardy, with fair vigor.
- 196321 - B. pumpellianus - Germany - Very promising, excellent aftermath, vigorous and productive.
- 202534 - B. sitchensis - Belgium - Fair forage production, lacks vigor.

- R. W. Robertson, Canada

- 205284 - B. commutatus - Turkey - Fall annual, root system not as good as B. arvensis but has excellent winterhardiness and spring recovery at Ellsberry.
- 232201 - B. carinatus - California - Excellent vigor and winterhardiness at Ellsberry.
- 232206 - B. carinatus - Colorado - Has excellent vigor and winterhardiness for temporary cover at Ellsberry.
- 232227 - B. marginatus - Idaho - Ditto PI 232206.
- 236754 - B. carinatus - Canada - Ditto PI 232206.
- 236765 - B. marginatus - Canada - Good vigor and seed set - no smut.
- 236768 - B. marginatus - Canada - Ditto PI 236765.

- Wm. Billings, Missouri

- 251681 - B. inermis - U.S.S.R. - Good vigor, good seeder but has weak culm and very susceptible to Pyrenophora bromi and Rhynchosporium secalis.
- P. N. Drolsom, Wisconsin
- 235469 - B. tomentellus - Switzerland - Has possible use for permanent pasture. Excellent stand obtained, seedling vigor good and appeared to be free from rust.
- 236764 - B. ciliatus - Canada - Makes early spring growth and exhibits much vigor throughout the growing season. Appears to be a good seed producer with good seed retention.
- 253300 - B. erectus - Yugoslavia - Has possible use as pasture. Appears late maturing and narrow leaved. Seed heads 30 inches high.
- D. Carroll, Michigan

d. Dactylis glomerata

The following introductions had good stand and vigor during the first 2 years.

- 172882 - Turkey - Poor in 3rd year at Rosemount.
172884 - Turkey - Poor in 3rd year.
173697 - Turkey - Medium in 3rd year.
200319 - Denmark - Excellent vigor in 3rd year.
205188 - Turkey
205266 - Turkey - Good vigor and stand in 3rd year.
206430 - Turkey - Excellent in 3rd year at Grand Rapids.
230116 - Iran - Excellent at Grand Rapids in 3rd year.

The following introductions had medium vigor and stand during the 1st and 2nd years.

- 173696 - Turkey - Excellent at Grand Rapids in 3rd year.
173698 - Turkey - Excellent at Grand Rapids in 3rd year.
173699 - Turkey
174201 - Turkey - Excellent vigor at Grand Rapids in 3rd year.
174773 - Sweden - " " " " " " " "
174774 - Sweden - " " " " " " " "
176555 - Turkey - " " " " " " " "
184040 - Yugoslavia - " " " " " " " "
189142 - Netherlands - " " " " " " " "
189388 - New Zealand - " " " " " " " "
196419 - Denmark - " " " " " " " "
196537 - Italy
197179 - England - Good stand and vigor at Rosemount.
199245 - Greece - Excellent stand and vigor at Rosemount and Grand Rapids in 3rd year.
202697 - Uruguay - Excellent vigor at Grand Rapids in 3rd year
204571 - Turkey - " " " " " " " "
204701 - Turkey - " " " " " " " "
205183 - Turkey - " " " " " " " "
205185 - Turkey
206429 - Turkey - " " " " " " " "

206430 - Turkey - Excellent vigor at Grand Rapids in 3rd year.
 206431 - Turkey - " " " " " " " "
 206432 - Turkey - " " " " " " " "
 217416 - Denmark - " " " " " " " "
 222761 - Argentina - " " " " " " " "
 234477 - Spain

- W. F. Wedin & G. Marten, Minnesota

e. Festuca spp.

The following introductions looked promising in plantings at Rosemount and/or Grand Rapids:

172388 <u>F. elatior</u> - Turkey	217417 <u>F. elatior</u> - Denmark
172423 <u>F. arundinacea</u> - Turkey	221919 <u>F. elatior</u> - Afghanistan
174209 <u>F. sp.</u> - Turkey	225823 <u>F. elatior</u> - Denmark
200320 <u>F. elatior</u> - Denmark	229500 <u>F. arundinacea</u> - Iran
201179 <u>F. elatior</u> - Netherlands	229501 <u>F. arundinacea</u> - Iran
201180 <u>F. elatior</u> - Netherlands	234777 <u>F. elatior</u> - Germany
201181 <u>F. elatior</u> - Netherlands	234906 <u>F. arundinacea</u> - Switzerl.
204447 <u>F. arundinacea</u> - Turkey	235156 <u>F. elatior</u> - Belgium
208680 <u>F. arundinacea</u> - Algeria	

- W. F. Wedin & G. Marten, Minnesota

189146 - F. ovina - Netherlands - Good color, vigorous, rapid recovery after clipping. Has possibility for gully and bank stabilization.

- D. Carroll, Michigan

225823 - F. elatior - Denmark - Clean, very leafy.
 234777 - F. elatior - Germany - Very good vigor, leafy, some rust.
 234892 - F. arundinacea - Switzerland - Excellent, leafy, tender, late.
 235018 - F. arundinacea - Germany - Excellent, leafy, tender, late.
 237178 - F. arundinacea - Holland - Clean, vigorous, may be of possible use.
 251822 - F. elatior - Italy - Clean, coarse, stemmy, some plants leafy.
 255170 - F. elatior - Poland - Variable, but some rust resistant plants. Good vigor.
 255876 - F. elatior - Poland - Ditto PI 255170
 255877 - F. elatior - Poland - " "
 255878 - F. elatior - Poland - " "
 255880 - F. rubra - Poland - Leafy, clean, no heading.

- P. N. Drolsom, Wisconsin

f. Lolium spp.

197270 - L. perenne - Finland - Only 8% winterkilled - fair forage yielder.

- R. W. Robertson, Canada

- 234442 - L. perenne - Belgium - Used in breeding program for rust resistance, leafiness and winterhardiness - relatively non-flowering.
- 241912 - L. multiflorum - Used in breeding program for its disease resistance, 1st year vigor, leafiness and relatively non-flowering habit.

- F. C. Elliott, Michigan

- 234442 - L. perenne - Belgium - Leafy, partially overwintered.

- P. N. Drolsom, Wisconsin

g. Panicum antidotale

The following accessions have value as a temporary pasture due to exceptional vigor:

- 204906 - Turkey
219609 - Pakistan
220026 - Afghanistan

- Wm. Billings, Missouri

h. Phalaris spp.

- 172443 - P. arundinacea - Turkey - Appears to be more productive than commercial lots, but is a very light seed producer.
- 209979 - P. arundinacea - Siberia - Very rapid spreader, fine stemmed and fine leaved, appears to be excellent sod former. Light seed producer. Vegetation turned brown in July and did not green up after fall rain.

- D. Carroll, Michigan

- 209979 - P. arundinacea - Siberia - Has promise for waterways and pasture - vigorous, aggressive and good appearance.
- 234780 - P. arundinacea - Germany - Holds promise for waterways and pasture. Moderate vigor and aggressiveness - disease resistant.
- 234790 - P. arundinacea - Sweden - Similar to 234780.

- Wm. Billings, Missouri

- 209979 - P. arundinacea - Siberia - Very leafy, late good forage yielder, leaves carried well off stem.

- R. W. Robertson, Canada

- 255387 - P. arundinacea - Poland - Good vigor and leafiness, good seed habits.

- P. N. Drolsom, Wisconsin

i. Phleum spp.

The following accessions have good resistance to rust and blight (Scalecotrichum), deep crowns, but are not of agricultural use in present form:

- 173016 - P. phleoides - Turkey 204476 P. arenarium - Turkey
204471 - P. arenarium - Turkey 204479 P. iranicum - Turkey
204475 - P. arenarium - Turkey

- P. N. Drolsom, Wisconsin

j. Sorghum spp.

The following have possibility for grain or forage as indicated:

- 71310 - S. vulgare - China - Forage - good habit and root quality.
- 170793 - S. vulgare - Turkey - Showed tetraploid characters - doesn't tiller.
- 199869 - S. arundinaceum - South Africa - Forage
- 208702 - S. alnum - Algeria - Forage
- 236278 - S. vulgare - Australia - Grain - tillerless.
- 236286 - S. vulgare - Australia - Grain - good stalk quality.
- 251672 - S. technicum - Forage.

- J. Newmarch, Iowa

Out of 415 introductions, the following were selected for leafiness, tillering, head size, seed size, disease resistance, lodging resistance, drought resistance and vigor. Self-pollinated seed was harvested and crossed onto male sterile lines, including one with bird resistance:

Sorghum vulgare

164903-Guatemala	192879-Java	221548-Africa
167093-Turkey	217666-Egyptain Sudan	221566-Africa
170781-Turkey	217681-Egyptain Sudan	221605-Africa
170793-Turkey	217685-Egyptain Sudan	221613-Africa
174379-Turkey	217688-Egyptain Sudan	221619-Africa
174380-Turkey	217689-Egyptain Sudan	221638-Africa
180003-India	217691-Egyptain Sudan	221685-Africa
181075-India	217725-Egyptain Sudan	221728-South Africa
181080-India	217759-Egyptain Sudan	223819-Afghanistan
181084-India	217778-Egyptain Sudan	234456-Japan
183149-India	217781-Egyptain Sudan	236282-Australia
186232-Costa Rica	217826-Egyptain Sudan	240996-Argentina

- R. J. Buker, Purdue University

The following contain sterile cytoplasm with Kafir chromosomes. Used as female parent with combine kafir-60 and have provided a male-sterile cytoplasm similar to the milo-kafir mechanism now used in hybrid sorghum production:

- 208190 - S. verticilliflorum - South Africa
- 246722 - S. vulgare - India

Tentatively, these lines seem to possess a fertile-type cytoplasm, but additional backcrosses with a kafir recurrent parent may isolate another sterile cytoplasm - need further evaluations:

- 213900 - S. verticilliflorum - Oklahoma
- 225006 - S. vulgare
- 226096 - S. verticilliflorum - Africa
- 247721 - S. vulgare
- 247723 - S. verticilliflorum
- 250104 - S. vulgare

- W. M. Ross, Kansas

156549 - S. arundinaceum - S. Rhodesia - Non-restorer in sterile cytoplasm.

- R. Baker, Iowa

226009 - S. sudanense - Australia - Late, vigorous. HCN content on 7/18 - 450 ppm; on 8/5 - 280 ppm.

255739 - S. sudanense - Turkey - Early, vigorous. HCN content on 7/18 - 875 ppm.

257294 - S. vulgare - Showed relatively less bird damage than others tested.

- P. N. Drolsom, Wisconsin

Sorghum vulgare

The following are sterile producers:

236279 - Australia	236285 - Australia
236281 - Australia	236288 - Australia
236282 - Australia	236291 - Australia
236284 - Australia	

The following contribute dwarf height to crosses, need further testing:

236283 - Australia	236290 - Australia
236286 - Australia	236292 - Australia
236287 - Australia	236293 - Australia
236289 - Australia	

236294 - Australia - Seed has bird resistance due to high tannin.

236295 - Australia - Very good combiner.

236296 - Australia - " " "

236297 - Australia - " " "

- P. Menge, Minnesota

k. Zea mays

Very strong stalk, very good production:

162571 - Argentina

174418 - Turkey

Very resistant to earworms in tests where there was a heavy outbreak of earworms.

217413 - "Zapalote Chico", Mexico - Husks extremely tight and much fiber.

218143 - New Mexico - Has a long tip cover.

218160 - Arizona - Many suckers.

218161 - Arizona - Many suckers.

218179 - Arizona --Long tip cover.

231738 - Turkey - Shrunken kernels - adequate tip cover.

- F. A. Weems, Washington

- 162575 - Argentina - Long eared - a promising line.
- 171896 - Turkey - Good line - had a nice yield.
- 175978 - Turkey - Early.
- 177596 - Turkey - Excellent stalk.
- 177631 - Turkey - Stands well.
- 185845 - Czechoslovakia - Smooth white ear - good stalk.
- 186206 - Argentina - Tall, late, nice ear.
- 217412 - Iowa - Being used for earliness in breeding lines.
- 240320 - Bolivia - Late, tall, good stander.
- 240328 - Bolivia - Late, tall, good stalk, but few ears.

- C. J. Hartman, Indiana

The following lines were incorporated into germplasm pool for future inbreeding. Possible contribution of good combining ability, good grain quality and some tendencies toward multiple ears:

- 162700 - Argentina
- 186187 - Uruguay
- 186221 - Argentina
- 186222 - Argentina
- 186227 - Uruguay

- L. Jump, Illinois

- 167959 - Turkey - Early flint, no suckers, 66 days to silking.
- 167968 - Turkey - " " " " 67 " " "
- 167972 - Turkey - " " , few suckers.
- 179130 - Turkey - " " , no suckers.
- 213804 - N. Dakota - Early - 56 days to silking.
- 228175 - Russia - Few suckers, stands well, 68 days to silking.

- C. Norskog, Minnesota

Need further evaluation for prolificacy:

- 167971 - Turkey
- 167997 - Turkey
- 179130 - Turkey
- 217404 - Argentina - Has excellent prolificacy.

- 172332 - Australia - Needs further evaluation for possible resistance to blackbird damage.
- 186191 - Uruguay - Being used for heat resistance. Crossed onto lines with poor heat resistance.
- 217407 - Peru - Used as a source of H. turcicum resistance. Crossed on late single eared line with poor H. turcicum resistance.
- 245136 - U.S.S.R. - Source of earliness for existing lines.
- 251934 - U.S.S.R. - " " " " " "

- K. Keltgen, Minnesota

Being used in selection program for their good standability:

- 167972 - Turkey
- 200204 - France - Inbred has good standability.
- 228175 - Russia - Has many suckers.
- 228176 - Russia

- A. Nevala, Wisconsin

- 167997 - Turkey - Appears to transmit its prolific tendency quite readily when used in making crosses. It averaged 1.4 ears per plant. It is a very early corn.
- 220406 - Afghanistan - Appears to be an early source of multiple ears - needs further evaluation for this.

- A. F. Troyer, Minnesota

Multiple eared - need further evaluation:

- 168048 - Turkey
 185665 - Haiti
 186191 - Uruguay
 193903 - Ethiopia - Tall plant, 2 eared.
 194390 - Ethiopia - " " " "
 196125 - Ethiopia - " " " "
 197503 - Ethiopia - Late, 2-4 eared, good standability.
 198900 - Argentina
 213716 - Iowa - 2 eared, tall, good standability.
 221704 - Indonesia - 2 eared, tall.

- J. D. Somers, Illinois

- 171904 - Turkey - Highly prolific.
 186191 - Uruguay - Possible drouth resistance.
 214291 - Iowa - Contributes ear length.
 217404 - Argentina - Highly prolific.
 217406 - Mexico - " "
 217407 - Peru - " "

- D. A. Stanley, Iowa

- 171904 - Turkey - 2-3 ears per plant.
 185665 - Haiti - May be resistant to corn borer.
 197503 - Ethiopia - 2 ears per plant.
 198900 - Argentina - 2-3 ears per plant.
 217404 - Argentina - Many small ears - red popcorn.
 217407 - Peru - Many small eared yellow popcorn.
 218179 - Arizona - 2-eared, variegated
 220406 - Afghanistan - Multiple eared.

- D. B. Ferguson, Minnesota

Resistant to Puccinia sorghi:

- | | |
|-----------------------|-----------------------|
| 172597 - Turkey | 218186 - Arizona |
| 186191 - Uruguay | 218187 - Arizona |
| 213777 - South Dakota | 221845 - South Africa |
| 214297 - Illinois | 251653 - Yugoslavia |
| 217405 - Texas | 251655 - Yugoslavia |
| 217415 - W. Virginia | |

- 217407 - Peru - Source of a new type of resistance to H. turcicum, designated as source B. Results indicate that it is carried by a single dominant gene, which is being added to several cornbelt inbred lines to determine the usefulness of this new type of resistance. Ref: Hooker, A. L. 1961. A new type of resistance in corn to Helminthosporium turcicum. Plant Disease Reporter 45: 780-781.

- A. L. Hooker, Illinois

- 183752 - Turkey - May have some value for earworm resistance. In 1961 test it was moderately susceptible to earworm damage but had attractive ears.
- 228169 - Russia - Observed only 1 ear in 1961. One dead larvae was found in the silk and another on the tip. The third one was not found. This line may have the lethal silk type of earworm resistance and should be tested again.

- E. V. Walter, Indiana

- 185664 - Haiti - Early maturing, open-pollinated type; shows earworm resistance. 90-day type.
- 185665 - Haiti - Early maturing, open-pollinated type; shows earworm resistance. 75-day type.

- Plant Inventory No. 157

- 200183 - Israel - Very low eared. Carries resistance to Helminthosporium turcicum.

- H. G. Nelson, Illinois

Good agronomic type:

- 213721 - Iowa
- 213724 - Iowa
- 217413 - Mexico - (Zapalote Chico) - Very tight, heavy husk.

- J. C. Sentz, Michigan

- 213776 - North Dakota - A red dent corn which yielded a selection which, at picking, breaks above the husk attachment so that the husk remains on the plant and only the bare ear is picked (1958).

Through selfing and selecting, the clean-husking line has been made to breed true and it was found that the clean husking character is simply inherited.

The same PI number provided a very good restoration gene for the cytoplasmic sterile from Vermont. Corns carrying Vermont cytoplasm X the recovery restorer gave practically complete restoration; whereas corns carrying Texas cytoplasm X the recovery restorer gave no restoration (1961).

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- 214279 - Canada - (Gaspe) Supplied essential earliness to corn breeding lines in Alaska.
- 217412 - Iowa - (Tom Thumb) Earliest popcorn in Alaska - rapid ear development after silking.
- 219872 - North Dakota - (Baby Orchard) Supplied earliness for sweet corn in Alaska breeding lines.
- 228173 - Russia - Provided height and ear length for corn breeding lines in Alaska.
- 236995 - Siberia - Early enough to provide ear breadth and plant vigor to Alaskan corn breeding lines.

- J. C. Brinsmade, Alaska

- 217404 - Argentina - Used in breeding program as a source of prolificacy.
 217407 - Peru - Also used as a source of prolificacy.

- G. M. Halverson, Iowa

- 217413 - Mexico - (Zapalote Chico) Earworm evaluation - as compared with some of the other "lethal silk" accessions, it showed some promise. This line has very tight husks which might enhance earworm resistance.

- D. Peters, Iowa

2. LEGUMES

a. Astragalus spp.

- 206405 - A. cicer - Turkey - Fair production, hardy, persistent.
 234686 - A. falcatus - Denmark - Persistent, hardy, low production.

R. W. Robertson, Canada

b. Coronilla varia

- 204871 - Turkey - Good forage yielder, hardy, vigorous, 23% dry matter.
 228373 - Iran - Tall, vigorous, good seed and forage yields, hardy, 26% dry matter.
 229968 - Iran - Fairly good forage, hardy.
 238142 - Turkey - High forage yield, vigorous, low seed yields, 27% dry matter, very hardy.

- R. W. Robertson, Canada

c. Dalea alopecuroides

- 231728 - Iowa - Produced good green manure and seed yield in 1961.

- R. G. Robinson, Minnesota

d. Lotus spp.

- 180171 - L. corniculatus - Czechoslovakia - Upright, hardy, root rot resistant, persistent and good forage quality.

- W. Billings, Missouri

- 193725 - L. corniculatus - Sweden - Good forage production, hardy, persistent.
 228150 - L. corniculatus - Russia - Good forage production, upright, persistent.
 228151 - L. corniculatus - U.S.S.R. - Good forage production, persistent.
 234786 - L. corniculatus - Sweden - Fair forage production, upright, persistent.

- R. W. Robertson, Canada

- 228150 - L. corniculatus - Russia - Appears to have promise as source material for selection.
 228151 - L. corniculatus - U.S.S.R. - Ditto 228150.
 258467 - L. corniculatus - U.S.S.R. - Ditto 228150.

- I. J. Johnson, Illinois

- 229569 - L. tenuis - Greece - Appears to be highly resistant to leafhoppers as well as possessing considerable vigor.

- C. N. Hittle, Illinois

e. Medicago spp.

Medicago sativa

- 170543 - Turkey - Single plant was selected for plowdown value and is in test as a clone and as an inbred line both in the Midwest and in California. Makes late fall growth.
 193291 - Yugoslavia - One plant saved - highly resistant to leafspot.
 199275 - Portugal - Fair resistance to leafspot.
 205329 - Peru - Has high level of resistance to leafhopper and one plant had zero score for leafspot. In addition, some plants may be useful as plowdowns. One or more single plant selections were made for further evaluation in Midwest and California.
 205634 - Argentina - A few plants are highly resistant to leafspot.
 207494 - Afghanistan - Vigorous late fall growth for plowdown.
 210367 - Iran - Makes vigorous late fall growth for plowdown.
 229570 - Greece - Vigorous late fall growth for plowdown.
 229954 - Iran - Very good fall growth for plowdown.
 234443 - Belgium - Very good fall growth for plowdown.
 234788 - Sweden - Some plants have fair resistance to leafspot.
 236606 - France - A few plants highly resistant to leafspot.
 239954 - Algeria - Vigorous late fall growth for plowdown.
 255178 - Poland - A few plants highly resistant to leafspot.
 255962 - Canada - A few plants highly resistant to leafspot.
 260982 - Yugoslavia - Very good fall growth for plowdown.

- I. J. Johnson, Illinois

Have some resistance to Phytophthora cryptogea:

- 172984 - M. sativa - Turkey
 172986 - M. sativa - Turkey
 189128 - M. lupulina - Denmark

- A. F. Schmitthenner, Ohio

- 193291 - M. sativa - Yugoslavia - Fair yields, 7% winterkilling.
 207494 - M. sativa - Afghanistan - Good forage, 13% winterkilling.
 231731 - M. falcata - Wisconsin - Has good forage yields, but low seed yields.
 234788 - M. sativa - Sweden - Hardy, fairly good forage yields.

- R. W. Robertson, Canada

M. sativa type clones from the following introductions, which showed leafhopper resistance for 2 years, are being intercrossed under isolation to form a germplasm pool for recurrent selection:

204889 - Turkey
206273 - Turkey
243224 - Iran

M. falcata introductions which showed leafhopper resistance during 1960-61:

251205 - Yugoslavia	258752 - U.S.S.R.
251689 - Russia	258753 - U.S.S.R.
251690 - Russia	258754 - U.S.S.R.
251830 - Austria	260246 - Germany
253445 - Yugoslavia	262532 - U.S.S.R.
258751 - U.S.S.R.	

One or more selections with apparent leafhopper resistance were obtained in 1961 from:

258757 - M. falcata - U.S.S.R.
258830 - M. sativa - U.S.S.R.
258838 - M. sativa - U.S.S.R.
258840 - M. sativa - U.S.S.R.

Selections with apparent resistance to leafhopper and antibiosis resistance to the spotted aphid were obtained from:

258754 - M. falcata - U.S.S.R.
258817 - M. sativa - U.S.S.R.
260246 - M. falcata - U.S.S.R.
262538 - M. sativa - Morocco

Selections with antibiosis resistance to both spotted alfalfa aphid and pea aphid were obtained from:

201864 - M. sativa - Iran
207494 - M. sativa - Afghanistan
217419 - M. sativa - Denmark
234205 - M. sativa - Iran

Selections with antibiosis resistance to the pea aphid were obtained from:

202824 - M. sativa - Arabia
206103 - M. sativa - France
211608 - M. sativa - Afghanistan
211609 - M. sativa - Afghanistan
217419 - M. sativa - Denmark
219928 - M. sativa - Afghanistan
220530 - M. sativa - Afghanistan
220668 - M. sativa - Afghanistan
221469 - M. sativa - Afghanistan
237231 - M. sativa - France

- W. R. Kehr, Nebraska

205329 - M. sativa - Peru - Looks good - resistant to insects during 1st year of observation.

- J. Miller, Iowa

f. Onobrychis spp.

- 167236 - O. viciaefolia - Turkey - Hardy, tall, vigorous, rather stemmy, good forage yields - 29% dry matter.
- 170583 - O. viciaefolia - Turkey - Vigorous, tall, fairly good forage yields - 20% D.M.
- 206577 - O. viciaefolia - Greece - Pasture type, fine texture forage, late, lots of seed, fair forage yields, 29% D.M.
- 227373 - O. viciaefolia - Iran - Hardy, coarse stems, fair forage yields, good aftermath.
- 228154 - O. antasiatica - Russia - Good forage and seed yields, coarse stems, vigorous, hardy, tall, 27% D.M.
- 228155 - O. arenaria - U.S.S.R. - Vigorous, tall, hardy, fairly leafy, coarse stems, good forage yields, 29% D.M.
- 228156 - O. viciaefolia - U.S.S.R. - Hardy, leafy, fair forage yields.
- R. W. Robertson, Canada

g. Trifolium spp.

- 204504 - T. pratense - Turkey - Has vigor and disease tolerance - being used in breeding program.
- 239963 - T. fragiferum - Portugal - Used in breeding program for its apparent resistance or tolerance to mosaic viruses.
- F. C. Elliott, Michigan
- 237196 - T. pratense - Selections were crossed with local material and F₂ is now under observation. Progenies are vigorous and bushy in growth.
- W. K. Smith, Wisconsin

3. VEGETABLES

a. Allium cepa

- 158134 - Russia - All bulbed predominantly small dry bulbs - may have value for production of 'sets'.
- 233190 - U.S.S.R. - Multiplier type - flat bottom.
- 255460 - Russia - Has fleshy roots.
- 262914 - U.S.S.R. - Might be used for bunching.
- 262922 - U.S.S.R. - Short top.
- 262926 - U.S.S.R. - Resembles sweet spanish habit of growth.
- C. H. Dearborn, Alaska

b. Asparagus spp.

- 169010 - A. officinalis - Turkey - Tolerant to rust in 1961.
- 169013 - A. officinalis - Turkey - Needs further evaluation for rust tolerance.
- 174056 - A. sp. - Turkey - Needs further evaluation for rust tolerance.
- 261641 - A. officinalis - Netherlands - Has possible rust tolerance.
- 262166 - A. officinalis - France - " " " "
- 262900 - A. officinalis - Spain - " " " "
- 263052 - A. officinalis - U.S.S.R. - " " " "

- L. C. Peirce, Iowa

c. Beta vulgaris

113306 - China - Had greater tolerance to 4(2,4-DB) than to 2,4-D.
This tolerance was not great enough to have much practical interest but may be worth investigating for fundamental information.

- R. N. Anderson, Minnesota

269308 - Sweden - During first year of evaluation, looks promising for earliness, good roots, and freedom from early seed stalk development.

269309 - Sweden - Ditto 269308.

269310 - Sweden - Possibly adapted to Alaskan conditions without further improvement - non bolting.

- D. H. Dinkel, Alaska

d. Brassica spp.(1) Brassica oleracea (cauliflower)

264653 - Excellent leaf cover, small dense heads.

264658 - " " " " " "

- A. Kallio, Alaska

(2) Brassica oleracea (broccoli)

189028 - Puerto Rico - Segregating for resistance to white-rust (Albugo candida).

249556 - Ditto 189028.

- P. Williams, Wisconsin

e. Cucumis spp.(1) Cucumis sativus

Showing promise for resistance to angular leaf spot:

137848 - Iran 179676 - India

169400 - Turkey 251519 - Iran

- J. C. Walker, Wisconsin

188807 - Philippine Islands - May be segregating for tolerance to angular leaf spot.

- C. E. Peterson, Michigan

212896 - India - Carries a recessive gene for delay in flowering in long days. This character is associated with the delay in germination. Freshly harvested seed of this accession remains dormant for at least 7 months over calcium chloride at 72° F. This new information may help the genetic study of the two characters involved.

220860 - Korea - Individual plants carry the non-branching gene.

265887 - Netherlands - Better - free cucumber.

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(2) Cucumis melo

236355 - Similar to Canadian Bellegarde but differs from standard netted muskmelon - may have some market appeal due to smooth skin and distinct shape.

- C. E. Peterson, Michigan

f. Cucurbita spp.

Possess high degree of resistance (lack of preference) to squash bug:

136448 - <u>C. pepo</u> - Manchuria	206426 - <u>C. pepo</u> - Turkey
174192 - <u>C. pepo</u> - Turkey	212008 - <u>C. pepo</u> - Iran
206596 - <u>C. pepo</u> - Turkey	216032 - <u>C. pepo</u> - India

Have high tolerance to heavy feeding damage by squash bugs:

169428 - <u>C. pepo</u> - Turkey	222247 - <u>C. pepo</u> - Iran
173686 - <u>C. pepo</u> - Turkey	234617 - <u>C. pepo</u> - So. Africa
212010 - <u>C. pepo</u> - Iran	

Three lines having the highest level of resistance to cucumber beetle feeding. Had a mean injury rating of 1.00, indicating only slight damage.

182202 - <u>C. pepo</u> - Turkey
234614 - <u>C. pepo</u> - So. Africa
265557 - <u>C. maxima</u> - Argentina

265557 - C. maxima - Argentina - An unusually vigorous and prolific bush C. max.

- C. V. Hall, Kansas

165027 - C. maxima - Turkey - Crossed with C. moschata for high total solids.

169441 - C. moschata - Turkey - Has high total solids.

192942 - C. moschata - China - Crosses with inbred lines will be tested in observational trials in 1962.

- H. H. Reichman, Illinois

Tolerant to squash mosaic virus. Crossed with yellow Crookneck, Early Prolific Straightneck and Long Cocozelle.

165558 - <u>C. pepo</u> - India	181878 - <u>C. pepo</u> - Syria
169454 - <u>C. pepo</u> - Turkey	183232 - <u>C. pepo</u> - Egypt
169477 - <u>C. pepo</u> - Turkey	212006 - <u>C. pepo</u> - Iran
172870 - <u>C. pepo</u> - Turkey	212060 - <u>C. pepo</u> - Greece
172872 - <u>C. pepo</u> - Turkey	216032 - <u>C. pepo</u> - India

Individual plant selections tolerant to squash mosaic virus. Crossed with yellow Crookneck, Early Prolific Straightneck and Long Cocozelle.

167053 - <u>C. pepo</u> - Turkey	176536 - <u>C. pepo</u> - Turkey
169426 - <u>C. pepo</u> - Turkey	212002 - <u>C. pepo</u> - Iran
169442 - <u>C. pepo</u> - Turkey	222247 - <u>C. pepo</u> - Iran
169474 - <u>C. pepo</u> - Turkey	227237 - <u>C. pepo</u> - Iran
171627 - <u>C. pepo</u> - Turkey	229688 - <u>C. pepo</u> - Turkey

- W. R. Sitterly, South Carolina

- 234616 - C. pepo - S. Africa - Used in breeding program for its resistance to squash mosaic and for its desirable exterior color.
- 234618 - C. pepo - Australia - Has some squash mosaic resistance but poor exterior and exterior color.

- D. F. Carlson, Illinois

g. Daucus carota

Non-bolting, long, uniform maturity.

269316 - Sweden

269321 - Sweden

- D. H. Dinkel, Alaska

h. Lycopersicon spp.

79532 - L. pimpinellifolium - Peru - Contributed wilt resistance to the following Missouri varieties:

Mosage released in 1958

Tomboy released in 1960

Mozark released in 1958

Tuckers Forcing released in 1956

- V. N. Lambeth, Missouri

Contributed disease resistance to variety 'Glecano':

79532 - L. pimpinellifolium - Peru

199016 - L. esculentum - Argentina

270203 - L. esculentum - Connecticut

270254 - L. esculentum - Canada

- C. F. Andrus

91908 - L. esculentum - Bulgaria - Showing good resistance to potato virus Y1 and Y4. A tomato with relatively attractive features.

131881 - L. esculentum - Argentina - Has good possibility for resistance to potato virus Y3.

- J. M. Walter, Florida

Show moderate resistance to early blight:

112835 - L. esc. X L. pimp. - Guatemala

127827 - L. hirsutum - Peru

195788 - L. esc. X L. pimp. - Guatemala

205020 - L. esc. X L. pimp. - W. Virginia

212411 - L. esc. X L. pimp. - Morocco

126445 - L. hirsutum - Peru - Shows resistance to early blight.

205002 - L. esc. X L. pimp. - W. Virginia - Shows resistance to early blight, appears outstanding due to its earliness and vigor.

- R. L. Nickeson, Illinois

Show resistance to Race I strains of Fusarium oxysporum f. lycopersici and Delray isolates:

- 126944 - L. peruvianum - Peru
- 126945 - L. peruvianum - Peru
- 211840 - L. pimpinellifolium - Peru - Might be useful as a source of resistance.
- 212407 - L. peruvianum - Peru
- 212408 - L. pimpinellifolium - Peru

- R. E. Stall, Florida

128657 - L. peruvianum - Peru - Resistant to Root Knot nematode.

- A. E. Kehr, W. S. Port, I. J. Thomason

Showed good ability to set fruit under cold conditions:

- 131881 - L. esculentum - Argentina
- 194883 - L. esculentum - New York

224674 - L. esculentum - New Hampshire - Showed very high ability to set fruit under cold conditions.

244672 - L. esculentum - India - Very heavy yielder.

250432 - L. esculentum - Czechoslovakia - Good yielder.

- S. Molnar, Alberta, Canada

196297 - L. esculentum - Nicaragua - Apparently immune to wilt and nematodes.

- Plant Inventory No. 159

223309 - L. esc. X L. pimp. - Rhode Island - Crack resistance of 223309 was recovered in crosses with Valiant and assigned the number 223311.

247089 - L. esculentum - Australia - Vigorous with dark, lance-like foliage and concentrated fruit set, approximately 60 fruits per plant with fine cover. Early to mid season in maturity and fruits are flat, rough and of good size. Used in crosses with Rhode Island and Summer Sunrise. The F₂ progenies were grown in the greenhouse in 1960-61, back-crosses to the recurrent parent were made in 1961. Some of the segregates are very promising, especially for leaf coverage of the fruit.

263726 - L. esculentum - Puerto Rico - Determinate with fair foliage cover. Early maturing, 10 days before Rutgers and highly productive. Fruit has good color and plant is resistant to Fusarium wilt. Promising as a market tomato in Delaware.

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Resistant to Fusarium oxysporum f. lycopersici Race I:

- 270236 - L. esculentum var. Manalucie - Ohio
- 270237 - L. esculentum var. Manasota - Florida
- 270250 - L. esculentum, Texto 2 - Texas
- 270278 - L. esculentum var. Ohio WR Jubilee - Ohio

- W. R. Henderson & N. N. Winstead,
N. Carolina

i. Pisum sativum

Used to develop breeding lines resistant to Fusarium root rot:

140165 - Afghanistan
174918 - India

Used to develop breeding lines resistant to Aphanomyces root rot:

166159 - India 169604 - Turkey
167250 - Turkey 180693 - Germany

Carry resistance to Aphanomyces root rot:

249645 - India
251051 - Yugoslavia

- J. L. Lockwood, Michigan

140295 - Iran - This line was the only one out of 55 introductions tested that was free of enation virus. This agrees with Barton and Schroeders results.

- H. H. Murakish, Michigan

210586 - Wisconsin - 'Wade', A productive pea frequently with 5 flowers per truss.

236493 - Sweden - High ovule or seed number per pod. Long pods with up to 11 seeds, thought to arise from probably 12 ovules per pod. Rapid growing dwarf with short internodes, early maturity and resistant to pea and bean mosaics.

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j. Raphanus sativus

182292 - Turkey - 100% resistant to Raphanus race of white-rust, Albugo candida.

The following lines have partial resistance to white-rust (Albugo candida):

109146 - Turkey	132245 - Denmark	175898 - Turkey
109147 - Turkey	140429 - Iran	176737 - Turkey
109562 - Turkey	173945 - India	176738 - Turkey
109566 - Turkey	174330 - Turkey	177528 - Turkey
116058 - India	174332 - Turkey	179470 - Syria
121007 - Turkey	174337 - Turkey	179727 - India
121009 - Turkey	174338 - Turkey	179982 - India
121011 - Turkey	175289 - India	205306 - Turkey
121021 - Turkey	175887 - Turkey	206468 - Turkey
121022 - Turkey	175889 - Turkey	206990 - Turkey
121027 - Turkey	175892 - Turkey	212081 - Afghanistan
121893 - India		

- P. Williams, Wisconsin

k. Solanum mammosum

183949 - India - Immune to Verticillium. However, attempts to make crosses with common eggplant have failed. Being used in breeding program.

- C. E. Peterson, Michigan

1. Spinacea oleracea

165560 - India - Tolerant, only, to Beet Mosaic virus.

- G. S. Pound, Wisconsin

4. OIL AND SPECIAL

a. Brassica spp.

Segregating for white-rust, Albugo candida, resistance:

175050 - B. campestris v. sarson - India

175089 - B. campestris - India

217514 - B. campestris - Pakistan

254358 - B. campestris - India

b. Eruca sativa

120927 - Turkey - 100% resistant to white-rust, Albugo candida.

- P. Williams, Wisconsin

c. Helianthus annuus

Need further evaluation (Tests at Coffeerville, Mississippi):

162454 - Uruguay - Strong seedling vigor, short type, 3½', 6" head.

165087 - Turkey - Strong seedling vigor, 9' tall, 10-10½" seed head, yield-2277 #/A, large seed.

170392 - Turkey - Strong seedling vigor, 5' tall, 9" head, yield - 2173 #/A.

170393 - Turkey - Strong seedling vigor, strong stems, 7½' tall, 11" head, medium size seed, yield - 2376 #/A.

170430 - Turkey - Medium seedling vigor, 6' tall, 11½" head, yield - 2475 #/A.

172907 - Turkey - Medium seedling vigor, fine stems, 6½' tall, 7½" head, yield - 1584 #/A.

175722 - Turkey - Medium seedling vigor, 4' tall, 8" head, yield - 1584 #/A.

175732 - Turkey - Strong seedling vigor, 9' tall, 10" head, yield - 2376 #/A.

175733 - Turkey - Strong seedling vigor, 7' tall, 8" head, yield - 1881 #/A.

177403 - Turkey - Medium seedling vigor, 4' tall, 5½" head, yield - 1584 #/A.

182778 - Turkey - Strong seedling vigor, 6' tall, 9" head, yield - 2079 #/A.

184049 - Yugoslavia - Strong seedling vigor, 6½' tall, 10" head, yield - 2970 #/A.

250019 - Iran - Medium seedling vigor, 7½' tall, 9" head, yield - 2277 #/A.

- R. B. Thornton, Beltsville

Yield data on sunflower introductions, compared with check varieties:

Advance hybrid (check)	540 #/A
Sunrise (check)	860 "
Beacon (check)	600 "
170392 - Turkey	1781 "
170410 - Turkey	1606 "
170411 - Turkey	1966 "
170430 - Turkey	2326 "
175723 - Turkey	1745 "
175726 - Turkey	2121 "
175730 - Turkey	2011 "
181769 - Lebanon	1770 "
182778 - Turkey	2241 "
184049 - Yugoslavia	1831 "
250019 - Iran	1846 "
251901 - U.S.S.R.	2172 "

- W. C. Young, Georgia

201815 - H. macrophyllus X H. tuberosus - Sweden - Total tuber yield -
2.4 lbs. per plant or 9504 lbs./A.

- L. E. Peterson, Iowa

Comparison of yield and oil content of sunflower introductions with
average of 4 check varieties:

Ave. One of 4 checks	1637 #/A	31.5% oil
253416 - Spain	2115 "	31.2% "
257640 - U.S.S.R.	1750 "	38.7% "
257641 - U.S.S.R.	2246 "	34.0% "
257642 - U.S.S.R.	2051 "	42.0% "
262516 - Israel	1854 "	45.1% "
265099 - U.S.S.R.	2064 "	40.8% "
265100 - U.S.S.R.	2210 "	40.3% "
265101 - U.S.S.R.	1952 "	40.7% "
265102 - U.S.S.R.	1920 "	36.4% "
265103 - U.S.S.R.	2140 "	33.1% "
265104 - U.S.S.R.	2179 "	38.4% "

- R. G. Robinson, Minnesota

Summary of 1960 evaluation of
New Crops for Industrial Utilization
(An extract of a summary of the 1960 evaluations
prepared by Dr. H. H. Kramer)

Studies of new crop species were made by the states of Indiana, Iowa, Kansas, Minnesota, and Missouri, in cooperation with Regional Project NC-7, the New Crops Research Branch, ARS, and the Northern Utilization Laboratory. Seed was distributed from the Regional Plant Introduction Station at Ames, Iowa.

1. Oil seed Crops

The species tested and the source of seed distributed are presented in Table 1. Pertinent planting and cultural data for each state are as follows:

Indiana:

Three seeding dates, April 14, May 24, and June 6 made with a spout seeder. Seeding rates are given in Table 2. All entries completely randomized within each planting date. Each plot consisted of 3 rows, 18 inches apart and 30 feet long. Twenty linear feet of the center row were harvested for yield. The first killing frost occurred on October 20, at which time all previously unharvested plots were sampled. Data are presented only for the first two planting dates.

Iowa:

Two seeding dates, April 23 and May 31, using a V-belt seeder. Each plot consisted of 2 rows, 15 feet long, 1 foot apart for low growing species, 2 feet apart for medium species, and 1 tall species in rows 3 feet apart. Two seeding rates, the one given in Table 2 and one at half that given in Table 2 were used. In addition, one replication at each date was hand weeded, while a second was cultivated only. Data presented are from the April seeding only, and from the best combination of rate and type of weed control.

Kansas:

Two seeding dates, April 21 and May 24. Shorter species in 18 inch rows, taller in 3 foot rows. Seeding rates are in Table 2. An additional planting of E. marginata with seed derived from the two planting dates of the 1959 Kansas trial was made. These seeds gave better stands than the Iowa produced seed.

Minnesota:

Two seeding dates, May 4 and June 1. Crops grown in rows 40 inches apart in 3 row plots cultivated. Seeding rates in Table 2. Yield determined on weed free center rows. First killing frost October 4.

Missouri:

All planted April 27. Three row plots, rows 26 inches apart, 20 feet long. Center, or all three rows harvested for yield.

In Table 2 are presented the seeding rates used and the stand obtained. In Table 3, the height and the date when mature are presented. In the Indiana, Minnesota, and Missouri tests, the harvest date is considered the mature date while in the Kansas and Iowa tests, a separate maturity date was given. In Table 4 are presented the yields in pounds per acre.

General comments regarding each of the species tested are summarized below.

Entries 1, 2, and 3 - Brassica campestris: In general, this species should be planted as early as feasible. It makes excellent early growth and seed yield is high. Irregular maturity may be a problem, as well as shattering and lodging. This species warrants intensive further study. It is noteworthy that N.U. 40504 is later than the other two and looks and behaves more like B. napus than campestris.

Entries 4, 5, and 6 - Brassica napus: Remarks similar to B. campestris. In general, it is later than B. campestris and is thicker stemmed. N.U. 40503 apparently is a winter annual since it did not flower in any of the tests in any state.

Entry 7 - Crambe abyssinica: The early planting was more successful in Indiana and Minnesota but not in Kansas. This species shows excellent potential as an oil crop. The seed increase of this species grown in Minnesota yielded 700 lbs. of clean seed per acre when handled with standard farm machinery.

Entry 8 - Eruca sativa: Early plantings most successful.

Entry 9 - Raphanus sativa: In general, the same remarks apply here as for the other crucifers. The fact that seed is embedded in pith like material within the silique makes threshing a difficult operation.

Entry 10- Daucus carota: This species is slow in germination and has poor seedling growth. In spite of this characteristic, best results were obtained with the earlier plantings. Irregular maturity and shattering are problems. Yields were particularly good in Iowa.

Entry 11 - Foeniculum vulgare: Some general remarks as for Daucus. This species was very late and still flowering at frost. Nevertheless excellent yields were obtained in Kansas.

Entry 12 - Satureja hortensis: Stands were poor and harvestable seed was obtained only in Kansas and Minnesota.

Entries 13 and 14 - Euphorbia marginata and heterophylla: Both species are too late to produce satisfactory yields even when planted early. Better emergence was obtained in later plantings in Indiana but the best yields were obtained in the earlier planting in Kansas.

Entry 15 - Rudbeckia bicolor: Poor stands were obtained in the early planting in Indiana but good stands were obtained in the later plantings. Yields were as good in later plantings as in earlier ones indicating that this species should not be planted too early.

Entry 16 - Helianthus maximiliani: Appeared promising only in Kansas.

Entry 17 - Limnanthes douglasii: This species must be regarded as agronomically unsuitable.

(Summary of Tables 1 through 4 referred to in text)

Table I. Species and varieties tested for industrial utilization, showing seed and pulp yields and effect of herbicides.

APPENDIX D

Genus and Species	N.U. or P.I. No.	Variety	Indiana		Iowa		Kansas		Minnesota		Mo. 1	# HERBICIDE (Minnesota)	CDA EPTC Amiben Propazine	
			1	2	1	2	1	2	1	2				
Brassica campestris	40430	Arlo	970	522	378	344	494	1095	275	380	1	2	3	5
"	40433	Polish	1174	519	668	588	1267	990	221	299	2	3	3	5
"	40504	Rapido II	1894	1021	436	1417	-----	1500	472	461	-	-	-	-
Brassica napus	40431	Golden	1501	1248	581	1997	752	1471	366	403	1	1	3	5
"	40432	Regina II	1104	448	871	1447	1009	1138	328	339	1	2	3	5
"	40503	Matador	-----	-----	-----	-----	-----	-----	-----	-----	-	-	-	-
Crambe abyssinica	24427	--	727	442	813	322	829	918	360	277	2†	2	3†	5
Eruca sativa	33745	--	819	182	697	182	-----	1066	495	508	1	2	2	5
Raphanus sativa	24038	--	915	-----	523	1439	129	1093	301	391	1-	1†	2-	5-
Daucus carota	14534	--	618	182	2091	846	-----	927	108	507	1-	-	-	-
Foeniculum vulgare	17354	--	211	-----	-----	2685	172	-----	-----	823	1	0	-	-
Satureja hortensis	19118	--	-----	-----	-----	430	-----	-----	-----	131	-	-	-	-
Euphorbia marginata	26094	--	-----	-----	-----	514	-----	279	-----	-----	-	-	-	-
Euphorbia heterophylla	32935	--	-----	419	-----	1095	115	45	36	-----	0	-	-	-
Rudbeckia bicolor	32975	--	-----	666	1133	889	784	247	175	372	4	4	2	5
Helianthus maximiliani	28353	--	144	221	484	1450	-----	349	-----	248	-	-	-	-
Limnanthes douglasii	40136	--	-----	-----	-----	-----	-----	47	-----	-----	2	3	2†	5

PULP YIELDS

	Indiana ¹			Iowa ²			Minnesota			Mo. 1
	1	2	3	1	2	1	2	1	2	
Pulp Yield (1,000 lbs/A) (Air dry wt.)										
190579	25.5	32.7	25.3	67.9	60.3	9.6	10.5	11.3	-----	-----
207836	20.2	28.3	29.6	62.9	46.2	9.6	11.0	11.9	1	5
207837	43.6	24.7	38.5	58.6	46.8	10.6	12.3	12.3	-----	-----

*Planting dated - 1 2
 Indiana 4/14 5/24
 Iowa 4/23 -
 Kansas 4/21 5/24
 Minnesota 5/4 6/1
 Missouri 4/27 -

¹ Pulp yield includes both seeds and stalks, harvested 11/17, most seed shattered.
² Yield is from best combination of planting rate and weed control.

0, no injury; 5, killed; ratings of 0-2 indicate potential selective use. Entries 10(D.carota), 14(E.heterophylla), 15(R.bicolor), and 17(L.douglasii) probably require herbicides or weeding to produce a crop. Other entries probably have sufficient weed competitive vigor.

NORTHERN UTILIZATION RESEARCH AND DEVELOPMENT DIVISION

I. Status of New Crops Research in UR

The committee will recall that new crops chemical screening research for the ARS is centralized at our Peoria Laboratory. On the basis of screening results, developmental chemical research on specific species or topics is assigned administratively to each of our four regional utilization laboratories. Assignments made to date are the following:

- EU, Philadelphia--Vernonia anthelmintica, oilseed containing epoxy fatty acids.
- SU, New Orleans--Cuphea,^{*} oilseed having mostly short-chain (10-carbon) acids.
Limnanthes,^{*} oilseed having long-chain (20- and 22-carbon) acids with unusual carbon-carbon unsaturation.
Umbelliferae,^{**} oilseeds containing petroselinic acid.
- WU, Albany, California--Dimorphotheca, oilseed having hydroxy-dienoic acid.
Lesquerella,^{*} oilseed having 14-hydroxyeicos-11-enoic acid.
- NU, Peoria--Erucic acid-containing oilseeds. Pulp fiber crops.

^{*} New assignments, spring 1961.

^{**}Withdrawn spring 1961 on advice of Crops Research Division.

II. The NU Program

A. Erucic acid-containing oilseeds. Studies include:

1. Preparation of chemical derivatives of the oils or of erucic acid, which may have industrial utility.
2. Surveying economics of erucic acid utilization in selected end uses.
3. Seeking oilseeds with maximum erucic acid content in their oil and minimum content of volatile mustard oils and/or goitrogenic substances.

B. Pulp fiber crops. Studies include:

1. Emphasis on more extensive screening in the plant groupings Hibiscus, Crotalaria, Sesbania, Abutilon, Sorghum and other Gramineae.
2. Development research on kenaf and okra to discover optimum pulping procedures, behavior of blends with fibers from other sources, unique properties which may lead to preferred end uses, and related lines of effort.

C. Seed polysaccharides.

Crotalaria intermedia seed contains galactomannan mucilage of about the same type and in the same quantity as guar. There is an existing and expanding industrial market for this kind of polysaccharide.

D. Chemical screening studies on new accessions of both seed and fiber are being continued at a rate of about 800 samples per year. Organic chemical structure work is done on the oil, protein, and carbohydrate components of selected species to obtain sufficient data to permit additional assignments for developmental research.

E. Contract research at the Montana AES.

Brassicas and related genera are being surveyed to find sources with seed oils of maximum erucic acid content. Results from first 9 months of contract operation are as follows:

GLC RESULTS ON FIRST 122 SAMPLES

<u>Species</u>	<u>Common Name</u>	<u>No.</u> <u>Samples</u>	<u>Erucic, %</u>		
			<u>Av.</u>	<u>High</u>	<u>Low</u>
B. napus	Golden rape	7	40	44	36
B. campestris	Polish or SW. German rape	4	25	27	19
B. juncea	Comm. Oriental yellow	35	22	25	18
B. juncea (brown)	Montana brown	41	36	47	20
B. pervidis	Tendergreen	1	48		
B. juncea var. foliosa	Broadleaf mustard	4	44	47	41
B. hirta	Commercial yellow	2	43	46	41
B. nigra	Trieste or black mustard	1	43		
B. besseriana	Commercial Montana brown	21	23	25	19
B. kaber	Charlock	1	11		
Eruca sativa		1	44		
Crambe abyssinica		4	53	53	53

III. Liaison between NU and NC-7 on suggested plantings of new industrial crops will continue to be through the New Crops Research Branch whose personnel know of our chemical results and are acquainted with the botanical aspects and crop potential of species under study.

There has not been time yet to analyze most of the 1960 crop materials grown by NC-7 and received at NU in the spring of 1961. Analytical data available are as follows:

NC-7 Samples analyzed August 1, 1960 to June 30, 1961

NU No.	Name	Wt./ 1,000	Dry Basis		HBr equiv.	Iodine Value	Ref. Index	Erucic Acid % in Oil
			Protein, %	Oil, %				
16586-59-5	<i>Brassica campestris</i>	2.2	29.9	36.6	--	102.1	1.4658	
19725-59-5	<i>Brassica cf. nigra</i>	1.0	34.9	23.2	--	114.8	1.4678	
40010-60-7	<i>Calendula officinalis</i>							
	(Removed Hull, 80% <u>1</u> /)	3.6	34.9	40.7 <u>3</u> /	0.1	153.6	1.4964	
17184-60-2-6	<i>Crambe abyssinica</i>	6.0	20.5	24.8		92.8	1.4655	57.4
	(Removed Hull, 42% <u>1</u> /	5.9	29.6	42.8				
	Hull	--	6.0	0.36				
17184-60-1C-6	<i>Crambe abyssinica</i>	7.2	19.8	26.6		92.4	1.4650	56.0
	(Removed Hull, 40% <u>1</u> /	7.0	27.6	45.0				
	Hull	--	5.9	0.49				
24427-59-5	<i>Crambe abyssinica</i>	5.2	27.2	30.0				
	(Removed Hull, 20% <u>1</u> /	4.2	33.4	39.7		91.7	1.4649	
24427-60-1C-6	<i>Crambe abyssinica</i>	5.1	21.3	29.6		92.8	1.4650	53.8
	(Removed Hull, 38% <u>1</u> /	6.4	27.8	45.4				
	Hull	--	6.4	0.63				
40752-60-6	<i>Crambe abyssinica</i>	7.1	20.2	28.2		93.6	1.4647	55.0
	(Removed Hull, 51% <u>1</u> /	6.3	27.5	46.4				
	Hull	--	7.1	1.0				
70480	<i>Crambe abyssinica</i> ² /	6.4	24.7	39.7		91.2	1.4646	
35743-60-8	<i>Cynara cardunculus</i>	17.8	21.2	18.0	0.2	113.0	1.4660	
14534-59-5	<i>Daucus carota</i>	0.6	24.6	12.1	12.5			
70171	<i>Daucus carota</i>	--	15.0	2.1				
70172	<i>Daucus carota</i>	--	13.1	1.4				
33745-59-5	<i>Eruca sativa</i>	2.8	35.8	31.2		100.4	1.4654	
32935-59-5	<i>Euphorbia heterophylla</i>	5.6	27.1	39.0		199.6	1.4757	
32935-60-7	<i>Euphorbia heterophylla</i>	6.1	27.6	37.8		195.1	1.4752	
26094-59-5	<i>Euphorbia marginata</i>	13.6	20.4	33.5		197.2	1.4750	
17354-60-7	<i>Foeniculum vulgare</i>	4.3	22.8	19.6		97.1	1.4708	
28353-59-5	<i>Helianthus maximilliani</i>	2.7	34.1	31.7	0.6	137.7	1.4687	
17301-60-7	<i>Heliospis helianthoides</i>	4.8	22.3	22.7	0.1	140.4	1.4691	
36396-60-8	<i>Hyptis suaveolens</i>	6.8	24.2	39.6		144.4	1.4698	

NC-7 Samples analyzed August 1, 1960 to June 30, 1961--continued

NU No.	Name	Wt./ 1,000	Dry Basis		HBr equiv.	Iodine Value	Ref. Index	Erucic Acid % in Oil
			Protein, %	Oil, %				
31789-59-1A	Matthiola bicornis	0.4	37.3	18.7		191.6	1.4755	
31789-59-1C	Matthiola bicornis	0.4	37.2	18.0		189.2	1.4746	
31789-59-2	Matthiola bicornis	0.6	35.4	28.0		192.0	1.4741	
31789-59-3	Matthiola bicornis	0.5	34.8	16.5		194.8	1.4744	
31789-59-5	Matthiola bicornis	0.6	35.8	28.3		194.7	1.4749	
24038-59-5	Raphanus sativus	7.8	36.3	34.8		98.0	1.4647	
32975-60-7	Rudbeckia bicolor	0.4	27.8	28.6		149.4	1.4700	
19118-59-2	Satureja hortensis	0.2	21.9	31.4		210.2	1.4773	
40584-60-7	Vernonia anthelmintica	4.2	18.7	23.3	67.2	103.4	1.4740	

Location Code Reference

1. Minnesota
2. Missouri
3. Iowa
4. Kansas
5. Indiana
6. Montana
7. Nebraska
8. Texas

1/ Percent hull based on sample received.

2/ 2.0 mg. isothiocyanate and 4.3 mg. thiooxazolidone per g. meal.

3/ Contains 42 percent conj. triene.