

M. S. Swaminathan

INTER-REGIONAL POTATO INTRODUCTION STATION

1952 Seed and Tuber List -- Solanum Species

The stocks listed are currently available for research studies. You are invited to make your selections of these materials. Send your requests in care of R. W. Houghs, Department of Genetics, Madison, Wisconsin.

The special inventories of plant introductions distributed by the Division of Plant Exploration and Introduction should be consulted for additional information regarding the origin and special field notes recorded by the plant explorer.

# POTATO EVALUATION

FEBRUARY 1953

## Evaluation Data

The evaluation data summarized in this report has been compiled by several laboratories. Most of the data has not been published and many of the investigations have been, more or less, of a preliminary nature. It was felt that this information would be of real value to potato breeders and other investigators in the evaluation and use of these introductions. An effort has been made and will be made in subsequent reports, to present the available pertinent information concerning new introductions in summarized form and to indicate fully the source of the information.

## Source of Information & Introductions

The following stations have contributed the evaluation reports and/or stocks that are listed herein:

Cornell Agricultural Experiment Station, Ithaca, New York  
Idaho Branch Experiment Station, Aberdeen, Idaho  
Iowa Agricultural Experiment Station, Ames, Iowa  
Louisiana Agricultural Experiment Station, Baton Rouge, Louisiana  
Michigan Agricultural Experiment Station, East Lansing, Michigan  
Minnesota Agricultural Experiment Station, St. Paul, Minnesota  
Nebraska Agricultural Experiment Station, Lincoln, Nebraska  
North Carolina Agricultural Experiment Station, Raleigh, N. Carolina  
Ohio Agricultural Experiment Station, Wooster, Ohio  
Pennsylvania Agricultural Experiment Station, State College, Pennsylvania  
South Dakota Agricultural Experiment Station, Brookings, South Dakota  
West Virginia Agricultural Experiment Station, Morgantown, West Virginia  
Wisconsin Agricultural Experiment Station, Madison, Wisconsin  
Division of Vegetable Crops and Diseases, Beltsville, Maryland and  
Presque Isle, Maine  
Division of Plant Exploration and Introduction, Beltsville, Maryland  
Field Crop Insect Laboratory, Fredericton, N. B., Canada  
Potato Genetics Station, Cambridge, England  
Max Planck Institute for Plant Breeding, Voldagsen über Elze, Germany  
Scottish Plant Breeding Station, Edinburgh, Scotland

## True Seed Introductions

A rather large portion of the seed lots are heterogeneous. Segregation, within an introduction, for morphological characteristics is often observable in the seedling populations. With regard to disease resistance, some seed lots have been found to be heterogeneous while others are very uniform in their disease reaction.

### Photoperiod

Many of the introductions being maintained at the Potato Introduction Station require a short day for tuberization. At this latitude the vines of the short-day plants are usually destroyed by frosts before tubers are formed in the field. This difficulty can be readily eliminated by planting these stocks in the greenhouse during July and August and harvesting the tuber crop in late November and December.

Most of the self-fertile Solanum species develop abundant quantities of true seed in the field at the Potato Introduction Station. Many other species develop true seed when properly pollinated (sib-matings, etc.) in the greenhouse.

### Taxonomy

Many of the stocks listed in this Inventory were introduced from Mexico by Dr. D. S. Correll, Division of Plant Exploration and Introduction, USDA. These stocks are listed according to his taxonomic classification. Refer to

USDA Agricultural Monograph # 11 (Issued May, 1952)

D. S. Correll

Section Tuberarium of the Genus Solanum of North America and Central America.

Most other stocks have been identified with the species name affixed by the donor.

### Chromosome Number

In the tabular list, the number in parentheses directly opposite the species name is the chromosome number ( $2n$ ) commonly reported for the species. The number of chromosomes listed for a specific plant introduction (P. I.) is based upon aceto-carmin, anther-smear counts made at this Station.

Differences in ploidy occur within some species. Of the introductions listed herein, the following differences should be noted:

1. S. verrucosum has been known as a diploid species ( $2n = 24$ ).  
S. verrucosum var. spectabilis, described by Correll, is a hexaploid ( $2n = 72$ ) [P. I. 161726 and 161740]
2. S. commersonii is considered a triploid species ( $2n = 36$ ). In P. I. 197760 the somatic chromosome number is 24. This situation has been discussed in detail by Koopmans, *Genetica* 25: 193-337, 1951.
3. S. cardiophyllum has been reported as a triploid species ( $2n = 36$ ). Some varieties (P. I.'s 186548 and 186549) are diploids ( $2n = 24$ ).

It should be noted that the new species S. guerreroense, described by Correll, is a hexaploid ( $2n = 72$ ).

Late Blight (Phytophthora infestans)

Screening for foliar resistance to late blight was conducted at Cornell, Iowa, West Virginia and the Max Planck Institute. The readings herein are based upon field and/or laboratory tests. No tests for tuber resistance have been reported. In view of the several races and the varied conditions utilized by the stations reporting, no attempt has been made to list the complete details of all late blight tests. However, the Potato Introduction Station will supply, upon request, the details on file concerning any particular stock.

Listed below are some of the more promising late blight resistant stocks recognized in the collection to date.

Solanum demissum introductions

P.I. 160221	Resistant to German strains A,B,C,D,E,F, (P. Schaper, Max Planck Institute, Germany)
" 160229	" " " " A,B,C, ( " " " )
" 160230	" " A,B,C,D, & BD. Not tested with BC. (M. E. Gallegly, West Virginia)
" 161153	" " German strains A,B,C,D,E,F, Seeds not homozygous, (Schaper, M. P. I., Germany)
" 161169	" " A,B,C,D, & BD; Not tested with BC. (Gallegly, W. Virginia)
" 161175	" " " " " " ; " " " " ( " " " )
" 161176	" " German strains A,B,C; (Schaper, M. P. I., Germany)
" 161180	" " " " " " ; ( " " " " " )
" 161181	" " A,B,C,D & BD; Not tested with BC. (Gallegly, W. V.)
" 161365	" " " " " " ; " " " " ( " " " )
" 161366	" " " " " " ; " " " " ( " " " )
" 161686	" " five German strains, (Schaper, M. P. I., Germany)
" 161693	" " German strains A,B,C, ( " " " " " )
" 161729	" " " " " " " , Seeds not homozygous; (Schaper, M. P. I., Germany)
" 161732	" " A,B,C,D and BD; Not tested with BC, (Gallegly, W.V.)

S. stoloniferum introductions

- P.I. 160224 Resistant to A,B,C,D, & BD; Not tested with BC, (Gallegly, West Virginia)
- " 160226 " " German strains A to F; Seeds not homozygous; (Schaper, M. P. I., Germany)
- " 161150 " " " " " A,B,C,; Seeds not homozygous; (" " " " )
- " 161158 " " A,B,C,D & BD; Not tested with BC, (Gallegly, W. V.)
- " 161178 " " " " " " ; " " " " ( " " " )
- " 161281 " " " " " " ; " " " " ( " " " )

S. verrucosum introductions

- P.I. 160228 Resistant to German strains A to F; Seeds not homozygous; (Schaper, M. P. I., Germany)
- " 161726 " " " " " A,B,C, ( " " " " , " )

S. antipoviczii - S. tuberosum hybrids

- P.I. 188662 Resistant to common, B,C,BC & BD (W. J. Hooker, Iowa)
- " 188663 " " " " " " "flecks with BD" (Hooker, Iowa)
- " 188667 " " " " " " " & BD (Hooker, Iowa)

S. demissum - S. tuberosum hybrids

- P.I. 188627 Resistant to common, B,C,D,BC & BD, (W. J. Hooker, Iowa)
- " 188628 " " " " B,C,BC; Susc. to BD, (Hooker, Iowa)
- " 188636 " " " " B,C,D,BC & BD (Hooker, Iowa)

In the tabular list the following general code has been used for reaction to P. infestans:

R = Resistant; R? = Resistant to certain strains; S = Susceptible

The late blight resistant varieties listed below are now available:

Aquila, Calrose, Canso, Chenango, Empire, Essex, Falke, Fruhnudel, Glenmeer, Keswick, Ostbote, Panther, Placid, Pommernbote, Populair, President, Robusta, Sebago, Snowdrift, Urtica, Virgil, Voran.

Additional stocks of value for late blight investigations will soon be available. Several of the demissum - tuberosum hybrids used by Drs. D. Reddick, W. R. Mills and L. C. Peterson, as differential hosts for races of P. infestans, have been added to the collection. Dr. W. Black of Scotland has provided the Station with selections carrying genes for resistance to P. infestans described in his recent publications. Requests have been made to other foreign laboratories for selections that may be useful as breeding stocks and/or race differentials.

#### Scab (Streptomyces scabies)

The following scab-resistant varieties of S. tuberosum are available.

Ackersegen, Arnica, Carnea, Cayuga, Hindenburg, Jubel, Ontario, Panther, Rheingold, Ysselster.

Immunity to scab has been reported in certain of the Solanum species. (S. caldasii, S. chacoense, S. commersonii and S. jamesii -- American Potato Jour. 16: 71-76). Selections of S. chacoense and S. commersonii are available (see tabular listing of species) but their reaction to scab has not been tested. Dr. J. L. Howatt, Fredericton, N. B., Canada, has recently found a population of S. chacoense segregating for resistance to scab in the ratio 3 resistant: 1 susceptible.

#### Verticillium

Testing for resistance to verticillium wilt, under field conditions in Idaho, has been reported by Dr. J. G. McLean. The following varieties are among those resistant to the disease in three year tests:

Ackersegen, Aquila, Empire, Friso, Menominee, Populair and Voran.

Populair appears to have unusually high resistance to the disease.

#### X-virus

Screening for resistance to X-virus was conducted at Cornell and the Max Planck Institute. Tests were made using the sap inoculation method. Immunity has been found in two selections of S. acaule (P.I.'s 175395 and 175396).

Tubers of the X-immune USDA seedling 41956 are available.

The following code has been used in the tabular list for reaction to X-virus:

I = Immune; R = Resistant; R? = possible resistance; S = Susceptible

#### Y-virus

Screening for resistance to the Y-virus was conducted at Cornell and the Max Planck Institute. Tests were made using the sap inoculation method. Several Y resistant stocks have recently been obtained from the Commonwealth Potato Collection (see tabular sheets).

The following introductions are reported to be immune to the Y-virus:

	<u>P. I. Number</u>
<u>S. antipoviczii</u>	-195164
<u>S. chacoense</u>	-- 175401, 175402
<u>S. demissum</u>	-- -175404, 175411
<u>S. gibberulosum</u>	-189215
<u>S. saltense</u>	-- -189217
* <u>S. stoloniferum</u>	-160224, 160226, 161150, 161160, 161170, 161171, 161172, 161364.
<u>S. tlaxcalense</u>	- 195169
<u>S. verrucosum</u> var. <u>spectabilis</u>	- 161726

Two selections of demissum, P.I.'s 175405 and 175408, are reported as hypersensitive to the Y-virus.

In the tabular list the reaction to Y-virus has been coded as follows:

I = Immune; R = Resistant; R? = possible resistance; Hy = Hypersensitive; S = Susceptible.

\* For details refer to:

H. Ross

IX Studies on mosaic resistance in the potato.

Proc. Conf. Potato Virus Diseases, Wageningen - Lisse  
13-17 August, 1951, p. 40-47.

#### Virus (General)

Some of the Solanum species are known to be of value as "test" plants for certain of the Solanum viruses. Two selections of S. demissum have been reported by Dr. G. Cockerham of Scotland and Dr. E. Kohler of Germany as good local lesion hosts for Y-virus of potato. Another S. demissum is reported by Dr. Cockerham as a local lesion host to A-virus of potato.

These three demissum selections are being increased and will soon be available for distribution.

#### Flea Beetle and Leafhopper

Screening for resistance to flea beetle and leafhopper damage was conducted by Dr. J. P. Slesman of the Ohio Agricultural Experiment Station. The conditions of these screening tests were as follows:

"In May the seedlings were transplanted to the field in single-plant plots. Each species was replicated five times in randomized blocks.

Leafhopper populations were determined by counting the nymphs on 10 leaves selected at random from each plot.

Flea beetle populations were not determined by actual count of the insects. The number of adult feeding punctures on a unit area of leaf surface was considered to be a more reliable index to the size of the adult population. A sample of five leaflets was selected at random from each plot and the number of holes was counted in a one-half square inch area taken from that portion of the leaflet where injury was heaviest."

An arbitrary code to indicate the extent of flea beetle injury has been used in the tabular section of this Inventory. The code is as follows:

HR = 0-6	flea beetle holes/	1/2 sq. inch leaf area
R = 6-20	" " " " " " " "	"
R7 = 20-30	" " " " " " " "	"
S = 30 or more	" " " " " " " "	"

The most resistant stocks are listed below with readings as taken directly from Slesman's report:

Species	P. I. Number	Flea Beetle holes per 1/2 sq. inch leaf area
<u>S. caldasii</u>		0.8
<u>S. chacoense</u>		0.0
<u>S. commersonii</u>		0.1
<u>S. demissum</u>	161163	0.0
<u>S. polyadenium</u>	161728	0.0
<u>S. schickii</u>	133710	4.8
<u>S. stoloniferum</u>	160224	2.0
"	160226	2.4
"	160371	3.4
"	161126	3.6
"	161138	0.2
"	161158	0.0
"	161160	2.5
"	161178	0.3
"	161770	0.3
<u>S. tuberosum</u> (check plant)	var. Irish Cobbler	65.0

The code used to indicate resistance to leafhoppers in the tabular section of this Inventory is as follows:

HR = 0-2 leafhopper nymphs per ten leaves  
 R = 2-10 " " " " "  
 R? = 10-25 " " " " "  
 S = 25 or more " " " " "

The most resistant stocks to leafhoppers are listed below with readings as taken from Slesman's report:

Species	P. I. Number	Leafhopper nymphs per 10 leaves (Average of two readings one month apart)
<u>S. boegeri</u>	133123	0.0
"	133659	0.2
<u>S. caldasii</u>		0.8
<u>S. chacoense</u>		0.0
<u>S. commersonii</u>		0.1
<u>S. demissum</u>	160221	1.4
"	160227	0.5
"	160230	1.3
"	161149	0.5
"	161725	1.7
<u>S. emmeae</u>	133662	0.7
<u>S. garciae</u>	133618	1.8
"	133663	0.5
<u>S. gibberulosum</u>	133664	0.7
<u>S. macolae</u>	133695	0.6
<u>S. parodii</u>	133708	0.9
<u>S. polyadenium</u>	161728	0.0
<u>S. schickii</u>	133127	1.5
"	133709	0.0
"	133710	0.3
"	133713	0.9
"	133718	0.2
"	133721	1.5
"	133722	1.2
<u>S. stoloniferum</u>	160224	1.0
species hybrid	133787	0.9
" "	133797	1.3
" "	133820	0.7
" "	133824	0.5
<u>S. tuberosum</u>	var. Irish Cobbler	73.0

Aphids (*Myzus persicae*)

Selections of three species, *S. demissum*, *S. stoloniferum*, and *S. polyadenium* have been found resistant to aphids (reported by Dr. Donald Reddick, Cornell University and Mr. Leo Dionne, Fredericton, N.B., Canada). The nature of the resistance was not reported. High mortality of the insect occurred when it was forced to feed, by caging, upon the following selections:

P. I. Number

*S. demissum* - 160222 and 161367

*S. stoloniferum* - 160224, 160226 and 161152

*S. polyadenium* - 161728

Colorado Potato Beetle

Screening for resistance to the Colorado potato beetle was conducted at the Max Planck Institute, Germany. Two methods were used in testing for resistance:

1. The disc method -

Larvae were placed in petri dishes and allowed to feed upon discs cut from the leaves of test plants. Resistance was measured by the percent mortality of the larvae.

2. The cage method -

Plants were grown in a large wire cage which contained both larvae and adult beetles. Resistance was measured by the amount of feeding injury.

Outstanding resistance to the Colorado potato beetle was found in

P. I. Number

*S. demissum* - 161154, 161179, 161181

*S. polyadenium* - 161728

*S. stoloniferum* - 161281; and especially

*S. chacoense* - (Max Planck selections)

In the tabular list the following code has been used for resistance to Colorado beetle injury. R = Resistant; R? = some resistance, S = Susceptible.

Frost

The frost readings listed were made at the Potato Introduction Station following a frost of 27° F. Many selections of *S. demissum* were undamaged at this temperature. Later a low of 23° F. destroyed or badly damaged all species in the field except *S. acaule*. *S. acaule*, undamaged at 23° F., is the most frost resistant species in the collection.

Southern Bacterial Wilt (*Pseudomonas solanacearum*)

Screening for resistance to Southern bacterial wilt was conducted at North Carolina. Several seedling populations of *S. demissum*, *S. stoloniferum* and *S. tuberosum* were tested; no promising resistance was found.

Resistance to the disease has been reported in five wild species (S. andigenum, S. antipoviczii, S. caldasii, S. chacoense and S. demissum) by Thung. (Phytopath 37: 373-381)

GENERAL

Brazilian Introductions

Of 51 introductions received from F. F. Guimaraes, Brazil (all S. tuberosum selections) the five listed below appear to be best adapted to U. S. growing conditions. Most of the 51 introductions have been tested for resistance to the following diseases (for details see 1950-51 Seed List of Solanum species).

common scab - Michigan, Nebraska, Wisconsin

late blight - North Carolina

ring rot - Wyoming

Southern bacterial wilt - North Carolina

Fusarium - Michigan

No outstanding resistance to disease has been reported among these introductions,

160169 very good tuber type with some growth cracks (Werner, Nebraska)

160188 good tuber shape and yield (Rieman, Wisconsin)

160189 good yield (Richardson, N. D.); very white flesh and very good tuber type (Werner, Nebraska)

160190 very good tuber type (Werner, Nebraska)

160194 good tuber type, very white flesh (Werner, Nebraska)  
high yield in preliminary trials (95% U. S. #1 - Riedl, Wyoming)

Abbreviations used in Tabular Section

CPC = Commonwealth Potato Collection

EBS = Erwin Bauer Sortiment