NOVEMBER 1966

TECHNICAL BULLETIN 253

A Survey of APHID RESISTANCE IN THE TUBER-BEARING SOLANUM (TOURN.) L. SPECIES

E. B. RADCLIFFE

F. I. LAUER

UNIVERSITY OF MINNESOTA
AGRICULTURAL EXPERIMENT STATION

A Survey of Aphid Resistance in the Tuber-Bearing Solanum (Tourn.) L. Species

E. B. Radcliffe and F. I. Lauer*

THE potato aphid, *Macrosiphum euphorbiae* Thomas, and the green peach aphid, *Myzus persicae* (Sulzer), are serious pests of the cultivated potato, *Solanum tuberosum* L. They are important primarily because they transmit virus diseases from diseased to healthy plants. The potato aphid is known to vector six different potato virus diseases while the green peach aphid vectors nine (8).[1] These diseases contribute to the "running out" of potato stocks.

Control of aphids to prevent transmission of such virus diseases as leaf roll, spindle tuber, A, B, and Y is basic to successful seed potato certification programs. Perhaps the ideal means for minimizing aphid-vectored viruses would be the development of aphid-resistant potato varieties. Accordingly, research was initiated in 1965 to discover possible sources of resistance to these aphids. The identification of resistance in tuber-bearing *Solanum* (Tourn.) L. species ultimately may make possible the development of an aphid-resistant cultivated potato.

In this country the cultivated potato represents a single species, S. *tuberosum*. However, over 150 tuber-bearing *Solanum* species are found in South and Central America, representing a vast reservoir of germ plasm. Until now, this material was largely unsurveyed for possible sources of aphid resistance.

A large and representative collection of the tuber-bearing *Solanum* species is maintained in the Inter-Regional Potato Collection (IR-1 Project) at Sturgeon Bay, Wisconsin (10). Primary purposes of this collection are to preserve and make readily available possible sources of desirable genes for incorporation into improved future varieties. According to Dodds (4), the most important use of the wild *Solanum* germ plasm will be to confer resistance. A review of useful characteristics reported (4) includes: immunity to virus X and frost resistance in S. *acaule* Bitt., immunity to viruses A and Y in S. *stoloniferum* Schlechtd. and S. *chacoense* Bitt., field resistance to late blight in S. *demissum* Lindl. and S. *stoloniferum,* and resistance to races of potato root eelworm in S. *spegazzinii* Bitt. and S. *vernei* Bitt. & Wittm. ex Engl.

This report gives data on resistance of an extensive sampling of the IR-1 *Solanum* stocks to both potato and green peach aphids.

Materials and Methods

From the IR-1 collection, 395 introductions were obtained and evaluated; they represented 66 potato species as well as several interspecific and intraspecific hybrids. About 80 percent of the introductions were supplied as seed and the remainder as tuber stocks. In addition, six check clones of commercial or advanced breeding stocks of S. *tuberosum* subspecies *tuberosum* (L.) Hawkes were included in the trial as susceptible checks.

True seed lots were started in the greenhouse on May 10. Twenty seeds from each seed lot were sown individually in 4.4-centimeter square peat pots. Pots were seeded according to the same completely randomized, four replicate design used in the field. Excess seed was sown in clay pots to provide for replacement of material failing to germinate or lost prior to planting.

Tuber lots were incorporated into the randomized design but were not started in the greenhouse. Ten days prior to transplanting, the tubers were removed from cold storage and held at room temperature to initiate sprouting.

On June 24-25, seedlings and tubers were placed in the field at the North Central Experiment Station, Grand Rapids, Minnesota. One-quarter liter "take hold" fertilizer solution, 10-52-17, was used with each plant or seed piece. Plants were spaced at approximately 1-meter intervals within and between rows. In some progenies, the plots consisted of less than five plants due either to poor seed lot germination or to the limited tuber stocks available. Spaces were not left in the field for missing plants.

Conventional clean cultivation was practiced. Application of a fungicide or insecticide was not necessary during the summer. No species of the potato insect complex was sufficiently abundant to cause plant injury. The

* E. B. Radcliffe is an assistant professor, Department of Entomology, Fisheries, and Wildlife. F. I. Lauer is a professor, Department of Horticultural Science.

The authors are indebted to Philip Clausen, graduate assistant, Department of Entomology, Fisheries, and Wildlife, for his able assistance in conducting this research.

[1] Numbers in parentheses refer to the literature citations on page 6.

two most abundant species were the potato aphid and the green peach aphid. Therefore, the opportunity was exceptional for evaluating resistance of various IR-1 introductions to attack by these two aphid species under field conditions without the confounding effects of insect injury, disease, or competition of other pest species. For example, hopperburn or tipburn caused by the potato leafhopper, *Empoasca fabae* Harris, was not evident on even the most susceptible introductions despite the lack of protective pesticides. Similarly, only three Colorado potato beetles, *Leptinotarsa decemlineata* Say, were observed on the more than 5,000 plants sampled during the investigation.

The unusually low aphid populations in the plots presented a problem in evaluation. With no apparent injury symptoms to provide criteria for rating, evaluations had to be based on aphid counts. Due to the numerous plants sampled, a rapid method for evaluation had to be developed. A timed-sample technique was used with two men counting. The sampling procedure was as follows:

Each man knelt before the plant and, at the indication of the recorder, began his observations. During the 20 seconds allotted for each evaluation, each man located and counted as many aphids as possible. Both aphid species almost invariably were found on the underside of leaves but not on the same portion of the plant. Potato aphids usually were located on upper and mid leaves while green peach aphids were predominantly on lower leaves. First the senior author examined a plant and recorded the abundance of potato aphids. Then an assistant sampled the plant for green peach aphids.

The 20 seconds allotted for sampling were adequate for examination of only a portion of the foliage of most plants. Therefore, results are mainly independent of influence arising from plant size. Although differences in growth habit and form of the various *Solanum* species partly affected the data obtained, in the authors' opinion, such error was not of major importance.

Plots were evaluated on August 5-13. Whenever stands permitted, three plants per progeny were sampled from each replicate. If the progeny plot consisted of more than three plants, the three largest and most vigorous plants were selected. All progenies in this report were represented by at least one plant in each replicate.

The replicate means were calculated on the basis of the number of plants sampled; the progeny means represent the averages of the replicate means regardless of how many observations contributed to each replicate mean. For the 401 entries considered, averages of 10.8 and 6.3 plants contributed to the progeny means for entries from true seed and tubers, respectively. Tuber clones supplied from the IR-1 collection usually consisted of five or six tubers. These tubers frequently were very small, making more exhaustive sampling impossible. With respect to growth, plants produced from seed or tubers were indistinguishable at the time of sampling.

Little difficulty was experienced in distinguishing between the two aphid species. The field key prepared by Dionne (3) was practical. A magnifying lens was not needed for identifying the aphids. Only apterous aphids were included in the counts. At least two other aphid species were observed on a few plants but were not tallied.

Results and Discussion

The ranked means of the 401 entries evaluated for resistance to potato and green peach aphids are listed in tables 1 and 2, respectively. The six *S. tuberosum* subspecies *tuberosum* check clones averaged 2.9 potato and 7.8 green peach aphids per plant. These means were slightly lower than those of the wild *S. tuberosum* subspecies *tuberosum* which averaged 3.5 potato and 8.9 green peach aphids per plant. However, the check clones were somewhat more susceptible than the *S. tuberosum* subspecies *andigena* (L.) Hawkes clones which averaged 2.9 potato and 6.5 green peach aphids per plant.

Within both the *S. tuberosum* subspecies *tuberosum* (1) and *S. tuberosum* subspecies *andigena,* considerable variation in aphid resistance has been observed. Presumably, aphid resistance of commercial potato varieties could be improved significantly by selection within the species *S. tuberosum* even without incorporation of genes from other species.

A much higher level of resistance to both aphid species was observed in several wild *Solanum* species. *S. trifidum* Correll averaged 1.9 potato and 0.3 green peach aphids per plant. For *S. bulbocastanum* Dun. in Poir., corresponding means were 1.8 and 1.5; for *S. hjertingii* Hawkes, 1.2 and 2.0.

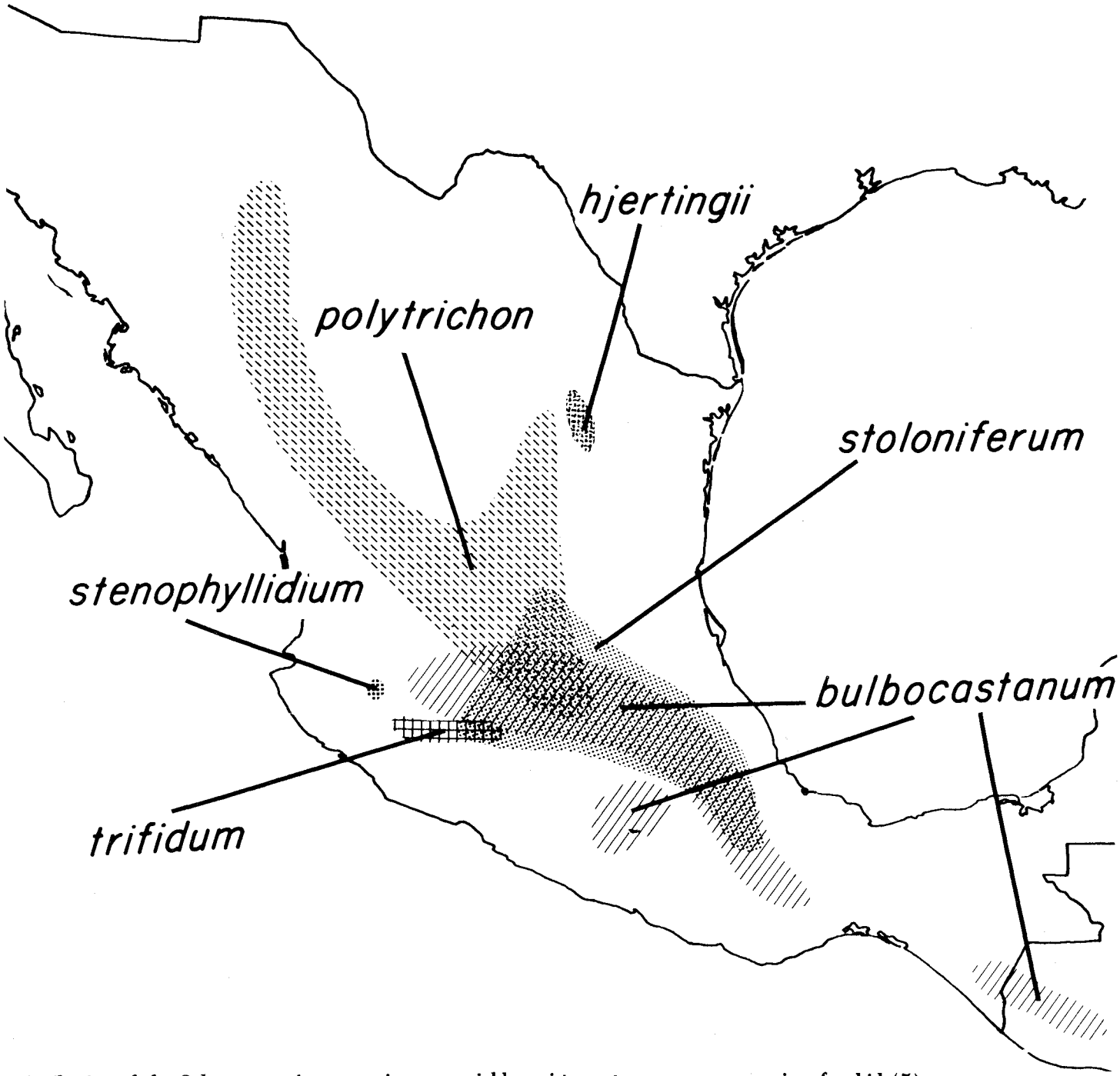
The taxonomic serial relationships of the potato species tested are shown in table 3. Of the 17 series represented, the most resistance to potato aphid was found in representatives of two series, Bulbocastana and Longipedicellata. The most resistance to green peach aphid was found in representatives of three series, Bulbocastana, Trifida, and Pinnatisecta. Within the series Bulbocastana, the species *S. bulbocastanum* showed resistance to both aphid species tested.

Of the seven entries possessing the most resistance to the potato aphid, four were selections of *S. bulbocastanum*: P.I. 275189, P.I. 243510, P.I. 275195, and P.I. 275193. No other species of *Solanum* was represented more than once in that group. Only 1 of the 401 entries screened, species *S. stoloniferum,* P.I. 160226, was completely free from the potato aphid. Of the species represented by a number of accessions, *S. hjertingii* averaged fewer potato aphids per plant, 1.2, than any other species. Ten of the 15 entries with the greatest resistance to the potato aphid, less than 0.7 aphid per plant, were collected in Mexico by J. G. Hawkes.[2]

[2] From the University of Birmingham, England.

Of the nine entries having the greatest resistance to the green peach aphid, four were S. *trifidum*: P.I. 255542, P.I. 255537, P.I. 255536, and P.I. 283064. Another three were S. *stenophyllidium* Bitt.: P.I. 255529, P.I. 255528, and P.I. 255530. Three of these entries (S. *trifidum*, P.I. 255537 and P.I. 255542, and S. *stenophyllidium*, P.I. 255529) did not support any green peach aphids. All but one of these nine introductions were collected in Mexico by K. C. Graham.[3]

With respect to both aphid species, resistance was concentrated in two individual collections made in central Mexico. From the distribution ranges presented by Hawkes (5), it is possible to speculate on the geographic origin of resistance to both aphid species (see



Distribution of the *Solanum* species possessing appreciable resistance to one or more species of aphid (5).

[3] From CDA Research Station, Fredericton, New Brunswick, Canada.

the figure). Both S. *hjertingii*, the species possessing the greatest potato aphid resistance, and S. *stenophyllidium*, the species possessing the greatest green peach aphid resistance (an average of 0.1 aphid per plant), are decidedly limited in distribution. The same is true of S. *trifidum* which was similarly highly resistant to the green peach aphid (0.3 aphid per plant).

The four species possessing the greatest resistance to the potato aphid were S. *hjertingii*, S. *bulbocastanum*, S. *stoloniferum*, and S. *polytrichon*. Three of the species are contiguous in distribution while S. *hjertingii* apparently is isolated from them. S. *bulbocastanum* belongs to the series Bulbocastana Rydb.; the other three species belong to the series Longipedicellata Buk. ex Buk. & Kameras. The entries representative of S. *bulbocastanum* possessed appreciable resistance to both aphid species considered. In the series Longipedicellata, resistance was specific for the potato aphid. This evidence suggests that potato aphid resistance evolved at least twice in the Mexican *Solanum* species.

The three *Solanum* species most resistant to the green peach aphid were S. *trifidum*, S. *stenophyllidium*, and S. *bulbocastanum*. Hawkes (5) questioned the validity of S. *stenophyllidium* as a separate species; it is closely related to S. *brachistotrichum* (Bitt.) Rydb. S. *trifidum* and S. *stenophyllidium*, both diploids, are placed in the series Pinnatisecta. Since the series Pinnatisecta and Bulbocastana can be hybridized (2), resistance to green peach aphid in these species may be of a common origin. These three species are found in the states of Michoacán and Jalisco, but S. *trifidum* and S. *stenophyllidium* are apparently exceedingly rare species of limited distribution.

Correll (2) observed that S. *bulbocastanum* and S. *polyadenium* Greenm. seldom were attacked by insects. In the present study, S. *bulbocastanum* showed appreciable resistance to both aphid species. However, entries of S. *polyadenium* proved highly susceptible to both aphid species. P.I. 275193, an entry of S. *bulbocastanum*, was the only introduction ranked in the top six entries for both insects. This introduction averaged 0.2 potato and 0.1 green peach aphids per plant.

Several species in the series Longipedicellata showed significant resistance to the potato aphid; S. *trifidum* and S. *stenophyllidium* of the series Pinnatisecta virtually were immune to the green peach aphid. S. *bulbocastanum* hybridizes with S. *trifidum* and S. *pinnatisectum* Dun. in DC. (2) but apparently not with species in either the series Longipedicellata or Tuberosa.

Almost all entries of S. *bulbocastanum*, S. *canasense* Hawkes, S. *curtilobum* Juz. & Buk., S. *ehrenbergii* (Bitt.) Rydb., S. *hjertingii*, S. *megistacrolobum* Bitt., S. *multidissectum* Hawkes, S. *phureja* Juz. & Buk., S. *sanctae-rosae* Hawkes, and S. *trifidum* were no more susceptible statistically to either aphid species than were the most resistant entries. In addition, a dozen species of *Solanum*, represented by three or less entries, were as resistant statistically as the most resistant entries. Because of the large number of entries and the unusually low aphid populations, many entry means could not be shown to be statistically different by the analytical procedures employed (tables 1 and 2). Perhaps if rank alone is considered, a better picture of the relative resistance of the various species can be obtained.

The entry most susceptible to attack by the potato aphid was S. *leptophyes* Bitt., P.I. 210056, averaging 15.0 potato aphids per plant. Among the potato species represented by five or more entries, S. *tarijense* Hawkes (8.9 per plant), S. *kurtzianum* Bitt. & Wittm. ex Engl. (8.0), S. *polyadenium* (6.7), S. *sparsipilum* (Bitt.) Juz. & Buk. (6.3), S. *pinnatisectum* (6.1), and S. *chacoense* (5.8) were the most susceptible to the potato aphid. In total, 67 entries representing 29 different species or hybrids were significantly more susceptible to the potato aphid than the single unattacked entry.

The three entries most susceptible to the green peach aphid were S. *demissum*, P.I. 275206, P.I. 161367, and P.I. 161715. Among the potato species most susceptible to green peach aphid and represented by five or more entries, S. *kurtzianum* (15.0 per plant), S. *demissum* (12.0), S. *sparsipilum* (11.5), S. *chacoense* (10.5), S. *polyadenium* (9.9), and S. *acaule* (8.0) were the most susceptible. In total, 84 entries representing 27 different species and hybrids were significantly more susceptible to green peach aphid than were the three unattacked entries.

Relative to the S. *tuberosum* subspecies *tuberosum* check clones, S. *stenophyllidium* had high resistance to green peach aphid (0.1 per plant) but was equally susceptible to the potato aphid (2.8). Similarly, S. *sanctae-rosae* was relatively resistant to green peach aphid (1.9) and about equal to the check clones for resistance to potato aphid (2.5). In contrast, S. *fendleri* A. Gray was more susceptible to potato aphid (5.0) and somewhat more resistant to green peach aphid (4.5) than was S. *tuberosum* subspecies *tuberosum*. S. *pinnatisectum* elicited a similar response with 6.1 green peach and 5.3 potato aphids per plant.

Entries of S. *kurtzianum*, S. *polyadenium*, S. *chacoense*, S. *tarijense*, and S. *sparsipilum* were among the most susceptible with respect to both aphid species.

The susceptibility of S. *demissum* to both aphid species is of interest because this species has attracted attention from European researchers due to its toxicity to Colorado potato beetle larvae (9, 13). Similarly, Sleesman (11) found S. *polyadenium* to be highly resistant if not immune to the potato leafhopper. He also found that three closely related species, S. *chacoense*, S. *commersonii* Dun. ex Poir., and S. *caldasii* Dun., were resistant. In the present study, S. *polyadenium* and S. *chacoense* were among the most susceptible *Solanum* species tested with reference to both aphid species. Sleesman (11) reported that S. *polyadenium* was nearly immune to attack of the flea beetle, *Epitrix cucumeris* L., and that S. *bulbocastanum* also had appreciable resistance to attack by this insect.

The basic chromosome number in the genus *Solanum* is 12 (7). Therefore, diploids have a somatic number of 2n=24, triploids of 2n=36, tetraploids of 2n=48, etc. The most interesting aspect of the cytology of the potatoes is that each set of 12 chromosomes apparently can pair with any other set of 12 (12). Therefore, it is relatively simple to account for the origin of the polyploid species in nature.

As with most other plant groups, not all species in the genus *Solanum* can be hybridized. For example, it has not been possible to cross species belonging to the series Pinnatisecta Rydb. and Bulbocastana with S. *tuberosum* (12). Interseries hybrids can be obtained from species in the series Demissa Buk. ex Buk. & Kameraz. Swaminathan and Howard (12) included the series Transaequatoriala Buk. ex Buk. & Kameraz in the Tuberosa.

Many factors are involved in making interseries hybridizations: environment, chromosome number, chromosome homology, morphology of flower, and physiology of female parent (12). The use of haploid parents (6) or colchicine-induced hybrids may increase the feasibility of some crosses. Many difficult crosses may yet be accomplished with embryo culture methods. The present study has presented this challenge to the plant breeder by the discovery of high levels of resistance to green peach aphid in series which have never been hybridized directly with S. *tuberosum*.

It is evident from this and other studies that a diverse group of genes is available in the wild *Solanums*. If these characteristics could be incorporated into a single variety, development of a commercial potato highly resistant to a wide range of pests would be possible. The present study was the first to deal specifically with aphid resistance in the wild *Solanum* species.

Literature Cited

1. Adams, J. B. 1946. Aphid resistance in potatoes. *Amer. Potato J.* 23:1-22.
2. Correll, D. S. 1962. *The potato and its wild relatives. Section Tuberarium of the genus Solanum.* Renner, Texas: Texas Research Foundation.
3. Dionne, L. A. 1947. Field identification of potato aphids. *The Canadian Entomologist* 89:191-93.
4. Dodds, K. S. 1966. The evolution of the cultivated potato. *Endeavour* 25:83-88.
5. Hawkes, J. G. 1966. Modern taxonomic work on the *Solanum* species of Mexico and adjacent countries. *Amer. Potato J.* 43:81-103.
6. Hougas, R. W. and S. J. Peloquin. 1958. The potential of potato haploids in breeding and genetic research. *Amer. Potato J.* 35:701-07.
7. Howard, H. W. 1960. Potato cytology and genetics, 1952-9. *Biblio. Genetica* 19:81-216.
8. Kennedy, J. S., M. F. Day, and V. F. A. Eastop. 1962. *A conspectus of aphids as vectors of plant viruses.* London: Commonwealth Institute of Entomology.
9. Kuhn, R. and I. Löw. 1955. Resistance factors against *Leptinotarsa decemlineata* Say, isolated from the leaves of wild *Solanum* species. pp.122-32. In: M. G. Sevag, R. D. Reid, and O. E. Reynolds. *Origins of resistance to toxic agents.* N. Y.: Academic Press.
10. Ross, R. W. and P. R. Rowe. 1965. *Inventory of tuber-bearing Solanum species.* Wis. Agr. Exp. Sta. Bull. 533.
11. Sleesman, J. P. 1940. Resistance in wild potatoes to attack by the potato leafhopper and the potato flea beetle. *Amer. Potato J.* 17:9-12.
12. Swaminathan, M. S. and H. W. Howard. 1953. The cytology and genetics of the potato *Solanum tuberosum* and related species. *Biblio. Genetica* 16:1-192.
13. Torka, M. 1950. II. Breeding potatoes with resistance to Colorado beetle. *Amer. Potato J.* 27:263-71.

Table 1. Relative resistance of various tuber-bearing Solanum introductions to potato aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no.[a]	Mean no. aphids/plant[b]	Not significantly different[c]
1	PI 210056	leptophyes	Peru	Hje 1592	14.96	through mean 6
2	PI 230480	polyadenium	Mexico	Gra 2	12.59	through mean 28
3	PI 217457	tarijense	Argentina	Sleu 4002	12.00	through mean 38
4	PI 218215	berthaultii	Argentina	EBS 191	11.84	through mean 39
5	WRF 330	kurtzianum			11.67	through mean 41
6	PI 230502	sparsipilum	Peru	Och 2064	11.33	through mean 47
7	PI 161367	demissum	Mexico	Cor 14286	10.34	through mean 74
8	PI 217458	tarijense	Argentina	Sleu 4024	10.34	through mean 74
9	PI 247322	colombianum	Colombia	Cor Co 525	10.25	through mean 76
10	PI 161715	demissum	Mexico	Cor 14379	9.42	through mean 120
11	PI 230465.2	sucrense	Bolivia	CPC 2058	9.25	through mean 129
12	WRF 332	kurtzianum			9.25	through mean 129
13	PI 234014	sparsipilum	Bolivia	Gan	9.17	through mean 131
14	WRF 345	pinnatisectum			9.08	through mean 135
15	PI 230489	pinnatisectum	Mexico	Roc S-44	9.00	through mean 140
16	PI 209411	chacoense	Argentina	Bru 57	8.83	through mean 149
17	USW 5298.3	stenotomum x 1N Katahdin		205526.2 x USW 1	8.63	through mean 158
18	PI 225636	tuberosum subsp. andigena	Colombia	CCC 679	8.46	through mean 168
19	PI 246536	sparsipilum	Peru	Cor P 230	8.33	through mean 180
20	PI 175435	kurtzianum	Argentina	EBS 42/	8.17	through mean 191
21	PI 275238	polyadenium	Mexico	Haw 1568	8.17	through mean 191
22	PI 275176	agrimonifolium	Guatemala	Haw 1891	8.13	through mean 200
23	PI 275141	chacoense	Argentina	Hje 357	8.00	through mean 212
24	WRF 311	chacoense			7.84	through mean 226
25	PI 275263	jamesii	USA	Gra 382 x 381	7.75	through mean 232
26	PI 205390	kurtzianum	Argentina	Bru	7.75	through mean 232
27	PI 186554	pinnatisectum	Mexico	Haw 1093	7.67	through mean 241
28	WRF 976	chacoense			7.58	through mean 251
29	PI 275162	fendleri	USA	Haw 1177	7.50	through mean 261
30	PI 283143	fendleri		Kra	7.50	through mean 261
31	PI 175401.1	chacoense	Argentina	EBS 20/5	7.50	through mean 261
32	PI 275165	fendleri	USA	Haw 1209	7.25	through mean 285
33	PI 275276	sparsipilum	Bolivia	EBS 1801	7.25	through mean 285
34	WRF 889	chacoense			7.17	through mean 293
35	PI 230466	tarijense	Bolivia	CPC 1727.3 x 144	7.17	through mean 293
36	PI 209412	chacoense	Argentina	Bru 58	7.13	through mean 301
37	PI 210032	acaule	Peru	Hje 1409	6.92	through mean 316
38	WRF 341	pinnatisectum			6.92	through mean 316
39	PI 265881	simplicifolium	Argentina	EBS 1802	6.79	through mean 333
40	PI 283100	fendleri	USA	Haw 1216	6.59	through mean 350
41	PI 161728	polyadenium	Mexico	Cor 14374	6.58	through mean 350
42	PI 209771	tuberosum subsp. tuberosum		Bru	6.42	through mean 363
43	PI 265885	oplocense	Bolivia	EBS 1789	6.42	through mean 363
44	PI 217451	chacoense	Argentina	Sleu 3566	6.33	through mean 368
45	PI 275159	fendleri	USA	Haw 1160	6.33	through mean 368
46	PI 275265	jamesii	USA	Gra 388 x 381	6.33	through mean 368
47	PI 283105.1	papita	Mexico	Haw 1475	6.25	through mean 374
48	PI 161163	demissum	Mexico	Cor 14236	6.00	through mean 387
49	PI 230468	vernei	Argentina	CPC 2413	6.00	through mean 387
50	PI 275224	oxycarpum	Mexico	Haw 1643	6.00	through mean 387
51	PI 275169	jamesii	USA	Haw 1176	5.75	through mean 396
52	PI 275233.3	pinnatisectum	Mexico	Haw 1455	5.75	through mean 396
53	PI 275237	polyadenium	Mexico	Haw 1567	5.75	through mean 396
54	PI 275167	fendleri	USA	Haw 1217	5.67	through mean 398
55	WRF 1154	tarijense			5.67	through mean 398

Table 1 (continued). Relative resistance of various tuber-bearing Solanum introductions to potato aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no[a]	Mean no. aphids/plant[b]	Not significantly different[c]
56	PI 234004	chaucha	Bolivia	Gan	5.63	through mean 399
57	PI 265860	boliviense	Bolivia	EBS 1795	5.58	through mean 399
58	WRF 365	chacoense			5.58	through mean 399
59	PI 275232	pinnatisectum	Mexico	Haw 1435	5.58	through mean 399
60	PI 230463	polyadenium	Mexico	CPC 2077.5	5.58	through mean 399
61	PI 217453	brevicaule	Argentina	Sleu 3748	5.50	through mean 400
62	PI 175138	chacoense	Argentina	Hje 56	5.50	through mean 400
63	PI 275163	fendleri	USA	Haw 1180	5.50	through mean 400
64	PI 283116	phureja	Colombia	Och 1399	5.50	through mean 400
65	PI 283114	mochicense	Peru	Och 1822	5.42	through mean 400
66	PI 218228	brevidens		EBS 388	5.33	through mean 400
67	PI 275136	chacoense	Argentina	Hje 349	5.33	through mean 400
68	PI 275158	fendleri	USA	Haw 1158	5.25	through mean 401
69	PI 245839	tuberosum subsp. tuberosum	Chile	Cor C 99	5.25	through mean 401
70	PI 275266	jamesii	USA	Gra 388 x 384	5.25	through mean 401
71	WRF 890	kurtzianum			5.21	through mean 401
72	PI 265858	berthaultii	Bolivia	EBS 1846	5.17	through mean 401
73	PI 275179	brachycarpum	Mexico	Haw 1547	5.13	through mean 401
74	PI 230517	unidentified	Ecuador	Och 2104	5.13	through mean 401
75	PI 175444	polyadenium	Mexico	EBS 51	5.09	through mean 401
76	PI 243503	commersonii	Argentina	Fer	5.08	through mean 401
77	PI 161168	demissum	Mexico	Cor 14243	5.00	through mean 401
78	PI 230562	vernei	Argentina	EBS 181	5.00	through mean 401
79	PI 186545	polytrichon	Mexico	Haw 1090	5.00	through mean 401
80	PI 275132	acaule	Argentina	Hje 353a	4.92	through mean 401
81	PI 230516.1	huancabambense	Peru	Och 2023	4.88	through mean 401
82	PI 208563	maglia	Argentina	Bru 39	4.88	through mean 401
83	USW 5305.1	stenotomum x 1N Katahdin		234011.4 x USW 1	4.88	through mean 401
84	PI 243345	bulbocastanum	Mexico	Gra 26 x 27	4.83	through mean 401
85	WRF 1277	ehrenbergii			4.83	through mean 401
86	PI 275239	polyadenium	Mexico	Haw 1569	4.83	through mean 401
87	USW 5323.4	phureja x 1N M 20-20-34		225696.1 x USW 4	4.79	through mean 401
88	PI 243350	agrimonifolium	Guatemala	Gra 145	4.75	through mean 401
89	PI 265876	bukasovii	Peru	EBS 1899	4.75	through mean 401
90	PI 275157	fendleri	USA	Haw 1157	4.75	through mean 401
91	PI 275229	papita	Mexico	Haw 1488	4.75	through mean 401
92	PI 234011	stenotomum	Bolivia	Gan 31	4.75	through mean 401
93	PI 265576	chacoense	Argentina	Cor A 707	4.67	through mean 401
94	PI 275156	fendleri	USA	Haw 1156	4.67	through mean 401
95	PI 265882	tuberosum subsp. andigena	Bolivia	EBS 1797	4.67	through mean 401
96	PI 275235	pinnatisectum	Mexico	Haw 1457	4.67	through mean 401
97	PI 210049	raphanifolium	Peru	Hje 1529	4.67	through mean 401
98	PI 265575	simplicifolium	Argentina	Cor A 705	4.67	through mean 401
99	PI 258910	stenotomum	Bolivia	Car	4.63	through mean 401
100	PI 258911	stenotomum	Bolivia	Car	4.63	through mean 401
101	PI 230582	chacoense		Slee	4.59	through mean 401
102	PI 275149	megistacrolobum	Argentina	Hje 316	4.59	through mean 401
103	PI 160228	verrucosum	Mexico	Cor 14217	4.58	through mean 401
104	PI 265874	megistacrolobum	Bolivia	EBS 1808	4.58	through mean 401
105	PI 233961	brevicaule	Bolivia	Gan	4.50	through mean 401
106	PI 245937.1	tuberosum subsp. tuberosum	Chile	Cor C 133	4.50	through mean 401
107	PI 186547	polytrichon	Mexico	Haw 1103	4.50	through mean 401
108	PI 230556	acaule	Argentina	EBS 496	4.42	through mean 401
109	PI 275264	jamesii	USA	Gra 386 x 388	4.42	through mean 401
110	PI 275275	pampasense	Peru	EBS 1895	4.42	through mean 401

Table 1 (continued). Relative resistance of various tuber-bearing Solanum introductions to potato aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no[a]	Mean no. aphids/plant[b]	Not significantly different[c]
111	PI 243460	phureja	Colombia	CCC 80	4.42	through mean 401
112	PI 208866	simplicifolium	Argentina	Bru 45	4.42	through mean 401
113	PI 275278.2	sucrense	Bolivia	EBS 1790	4.38	through mean 401
114	PI 275262	jamesii	USA	Gra 381 x 386	4.25	through mean 401
115	PI 275153	sparsipilum	Peru	Hje 1534	4.25	through mean 401
116	PI 186181	curtilobum	Peru	Och	4.21	through mean 401
117	PI 218221	sanctae-rosae	Argentina	EBS 438	4.17	through mean 401
118	PI 265869	sparsipilum	Bolivia	EBS 1820	4.17	through mean 401
119	PI 275143	spegazzinii	Argentina	Hje 1893	4.17	through mean 401
120	PI 255528	stenophyllidium	Mexico	Gra 347 x 345	4.17	through mean 401
121	PI 275139	chacoense	Argentina	Hje 297	4.09	through mean 401
122	USW 5293.2	phureja x 1N Katahdin		27510.2 x USW 1	4.09	through mean 401
123	PI 217450	acaule	Argentina	Sleu 4114	4.00	through mean 401
124	PI 275125	acaule	Argentina	Hje 344	4.00	through mean 401
125	PI 186180	tuberosum subsp. andigena	Peru	Och	4.00	through mean 401
126	PI 239423	hougasii	Mexico	Gra 368	4.00	through mean 401
127	USW 5288.1	phureja x 1N Katahdin		225683.1 x USW 1	4.00	through mean 401
128	USW 5314.1	phureja x 1N M 20-20-34		225708.1 x USW 4	4.00	through mean 401
129	PI 233980	ajanhuiri	Bolivia	Gan	4.00	through mean 401
130	PI 161174	hougasii	Mexico	Cor 14253	3.92	through mean 401
131	PI 234007	stenotomum	Bolivia	Gan 29	3.92	through mean 401
132	PI 205395	acaule	Argentina	Bru	3.84	through mean 401
133		tuberosum subsp. tuberosum		Minn. Code 157	3.84	through mean 401
134	PI 265871	brevicaule	Bolivia	EBS 1812	3.79	through mean 401
135	PI 225694	phureja	Colombia	CCC 10	3.79	through mean 401
136	PI 161364	stoloniferum	Mexico	Cor 14270	3.75	through mean 401
137	PI 283079.1	marinasense	Peru	EBS 1883	3.75	through mean 401
138	PI 246497.1	tuberosum subsp. andigena	Peru	Cor P 164	3.75	through mean 401
139	PI 225667	phureja	Colombia	CCC 147	3.75	through mean 401
140	PI 275231	pinnatisectum	Mexico	Haw 1426	3.75	through mean 401
141	PI 243352	agrimonifolium	Guatemala	Gra 1458	3.67	through mean 401
142	PI 283069	berthaultii	Bolivia	EBS 1842	3.67	through mean 401
143	WRF 1276	ehrenbergii			3.67	through mean 401
144	WRF 1306	tuberosum subsp. tuberosum			3.67	through mean 401
145	PI 225681	phureja	Colombia	CCC 143	3.67	through mean 401
146	WRF 306	chacoense			3.63	through mean 401
147	PI 225693	phureja	Colombia	CCC 11	3.63	through mean 401
148	PI 161154	demissum	Mexico	Cor 14223	3.58	through mean 401
149		tuberosum subsp. tuberosum, "Norland"			3.58	through mean 401
150	PI 245939	etuberosum	Chile	Cor C 134	3.50	through mean 401
151	PI 234015	stenotomum	Bolivia	Gan 63	3.50	through mean 401
152	PI 133619	chacoense	Argentina		3.50	through mean 401
153	PI 265879	megistacrolobum	Argentina	EBS 1783	3.50	through mean 401
154	PI 283095.3	brachistotrichum	Mexico	Haw 1287 x 1471	3.38	through mean 401
155	PI 266387	chomatophilum	Peru	Cor P 862	3.34	through mean 401
156	PI 255533	stoloniferum	Mexico	Gra 341	3.34	through mean 401
157	PI 275257	verrucosum	Mexico	Haw 1532	3.33	through mean 401
158	PI 283081	medians	Peru	EBS 1906	3.33	through mean 401
159	PI 205622	tuberosum subsp. andigena		CPC 1673 x 2201 (30)	3.29	through mean 401
160	PI 230500	tuberosum subsp. andigena	Peru	Och 1245	3.29	through mean 401
161	PI 218224	simplicifolium	Argentina	EBS 447	3.29	through mean 401
162	PI 275206	demissum	Mexico	Haw 1295	3.25	through mean 401
163	WRF 276	ehrenbergii			3.25	through mean 401
164	PI 245931.1	tuberosum subsp. tuberosum	Chile	Cor C 130	3.25	through mean 401
165	USW 5293.6	phureja x 1N Katahdin		275710.2 x USW 1	3.25	through mean 401

Table 1 (continued). Relative resistance of various tuber-bearing Solanum introductions to potato aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no[a]	Mean no. aphids/plant[b]	Not significantly different
166	USW 5298.5	stenotomum x 1N Katahdin		205526.2 x USW 1	3.25	through mean 401
167	PI 258909	stenotomum	Bolivia	Car	3.25	through mean 401
168	PI 230513	stenotomum	Peru	Och 1933	3.17	through mean 401
169	PI 255490	ajanhuiri	Bolivia	CEEA 17	3.13	through mean 401
170	PI 275242.3	sambucinum	Mexico	Haw 1439	3.13	through mean 401
171	PI 225668	phureja	Colombia	CCC 247	3.13	through mean 401
172	PI 225682	phureja	Colombia	CCC 193	3.13	through mean 401
173	PI 275152	sanctae-rosae	Argentina	Hje 328	3.13	through mean 401
174	PI 243505	bulbocastanum	Mexico	Gra 361 x 359	3.09	through mean 401
175	PI 233998	tuberosum subsp. andigena	Bolivia	Gan 34	3.09	through mean 401
176	PI 210039	sparsipilum	Bolivia	Hje 1051	3.09	through mean 401
177	PI 266381	acaule	Peru	Cor P 863	3.08	through mean 401
178	PI 275161	fendleri	USA	Haw 1174	3.08	through mean 401
179	PI 265862	raphanifolium	Peru	EBS 1880	3.08	through mean 401
180	PI 275256	verrucosum	Mexico	Haw 1528	3.04	through mean 401
181	PI 275214	ehrenbergii	Mexico	Haw 1429	3.00	through mean 401
182	PI 255532	stoloniferum	Mexico	Gra 334	3.00	through mean 401
183	PI 230497	tuberosum subsp. andigena	Peru	Och 816	3.00	through mean 401
184	PI 275228	papita	Mexico	Haw 1486	3.00	through mean 401
185	PI 186176	acaule	Peru	Och	2.92	through mean 401
186	PI 275129	acaule	Peru	Hje 1582	2.92	through mean 401
187	PI 230457	tuberosum subsp. andigena		CPC 1464	2.92	through mean 401
188	USW 5323.1	phureja x 1N M 20-20-34		225696.1 x USW 4	2.92	through mean 401
189	PI 275147	megistacrolobum	Argentina	Hje 366	2.92	through mean 401
190	PI 283062	cardiophyllum	Mexico	Gra	2.88	through mean 401
191	USW 5314.2	phureja x 1N M 20-20-34		225708.1 x USW 4	2.88	through mean 401
192	PI 265861	boliviense	Bolivia	EBS 1847	2.84	through mean 401
193	PI 283102	fendleri	Mexico	Haw 1314	2.84	through mean 401
194	PI 255534	stoloniferum	Mexico	Gra 366	2.84	through mean 401
195	PI 255538	trifidum	Mexico	Gra 308 x 301	2.84	through mean 401
196	PI 275255	verrucosum	Mexico	Haw 1527	2.84	through mean 401
197	PI 205515	demissum	Mexico	CPC 14.2	2.83	through mean 401
198	PI 186178	tuberosum subsp. andigena	Peru	Och	2.83	through mean 401
199	PI 195198	phureja	Colombia	CPC 979	2.83	through mean 401
200	PI 255529	stenophyllidium	Mexico	Gra 347 x 348	2.83	through mean 401
201	PI 218217	colombianum	Colombia	EBS 572	2.79	through mean 401
202	PI 243507	bulbocastanum	Mexico	Gra 386 x 362	2.75	through mean 401
203	PI 275245	stoloniferum	Mexico	Haw 1388	2.75	through mean 401
204	PI 233992	tuberosum subsp. andigena	Bolivia	Gan 39	2.75	through mean 401
205	PI 233997	tuberosum subsp. andigena	Bolivia	Gan 45	2.75	through mean 401
206	PI 275260	verrucosum	Mexico	Haw 1658	2.75	through mean 401
207		tuberosum subsp. tuberosum, "Pontiac"			2.75	through mean 401
208	PI 210034	megistacrolobum	Bolivia	Hje 1028	2.75	through mean 401
209	PI 210048	raphanifolium	Peru	Hje 1521	2.75	through mean 401
210	PI 230464	sanctae-rosae	Argentina	CPC 2483	2.75	through mean 401
211	PI 218222	simplicifolium	Argentina	EBS 1876	2.75	through mean 401
212	PI 275227	papita	Mexico	Haw 1482	2.71	through mean 401
213	PI 175396	acaule		EBS 208a	2.67	through mean 401
214	PI 210033	acaule	Peru	Hje 1086	2.67	through mean 401
215	PI 210040	marinasense	Peru	Hje 1531b	2.67	through mean 401
216	PI 258855	phureja	Bolivia	Gan	2.62	through mean 401
217	PI 230498	tuberosum subsp. andigena	Peru	Och 868	2.59	through mean 401
218	PI 210043	multidissectum	Peru	Hje 1340	2.59	through mean 401
219	PI 225649	curtilobum	Colombia	CCC 479	2.58	through mean 401
220	PI 255539	trifidum	Mexico	Gra 308 x 305	2.58	through mean 401

Table 1 (continued). Relative resistance of various tuber-bearing Solanum introductions to potato aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no[a]	Mean no. aphids/plant[b]	Not significantly different[c]
221	PI 255540	trifidum	Mexico	Gra 309 x 311	2.58	through mean 401
222	PI 230474	tuberosum subsp. andigena	Peru	IAIAS 3323	2.58	through mean 401
223		tuberosum subsp. tuberosum		Minn. Code 151	2.58	through mean 401
224	PI 275148	megistacrolobum	Argentina	Hje 255	2.58	through mean 401
225	PI 255527	stenophyllidium	Mexico	Gra 346 x 348	2.58	through mean 401
226	PI 230512	stenotomum	Peru	Och 1922	2.58	through mean 401
227	PI 245764	brevidens	Chile	Cor C 15	2.50	through mean 401
228	PI 230584.4	kurtzianum	Argentina	Slee	2.50	through mean 401
229	PI 246979	tuberosum subsp. andigena	Ecuador	Cor E 448	2.50	through mean 401
230		tuberosum subsp. tuberosum, "Chisago"			2.50	through mean 401
231	PI 195214	stenotomum	Peru	CPC 1793	2.50	through mean 401
232	PI 265863	canasense	Peru	EBS 1825	2.46	through mean 401
233	PI 160212	demissum	Mexico	Cor 14217	2.42	through mean 401
234	PI 275248	stoloniferum	Mexico	Haw 1520	2.42	through mean 401
235	PI 275250	stoloniferum	Mexico	Haw 1554	2.42	through mean 401
236	PI 275234	pinnatisectum	Mexico	Haw 1456	2.42	through mean 401
237	PI 218226	simplicifolium		EBS 626	2.42	through mean 401
238	PI 243351	agrimonifolium	Guatemala	Gra 145a	2.38	through mean 401
239	PI 245842	tuberosum subsp. tuberosum	Chile	Cor C 101	2.38	through mean 401
240	PI 245933.1	tuberosum subsp. tuberosum	Chile	Cor C 131	2.38	through mean 401
241	PI 225673	phureja	Colombia	CCC 178	2.38	through mean 401
242	PI 275199	bulbocastanum	Mexico	Haw 1596	2.34	through mean 401
243	PI 218047	demissum		BB	2.34	through mean 401
244	PI 251741	papita	Mexico	Haw 1476	2.34	through mean 401
245	PI 265878	raphanifolium	Peru	EBS 1879	2.34	through mean 401
246	PI 275133	acaule	Argentina	Hje 1898	2.33	through mean 401
247	PI 275251	stoloniferum	Mexico	Haw 1669	2.33	through mean 401
248	PI 265578	megistacrolobum	Bolivia	Cor B 654	2.33	through mean 401
249	PI 225683	phureja	Colombia	CCC 192	2.33	through mean 401
250	PI 283089	sanctae-rosae	Argentina	EBS 1779	2.33	through mean 401
251	PI 205526	stenotomum	Peru	CPC 320 x 1839	2.33	through mean 401
252	PI 255501	acaule	Argentina	Bru 802	2.25	through mean 401
253	PI 161719	demissum	Mexico	Cor 14413	2.25	through mean 401
254	PI 218220	venturii	Argentina	EBS 457	2.25	through mean 401
255	PI 246488	raphanifolium	Peru	Cor P 218	2.25	through mean 401
256	PI 218223	simplicifolium	Argentina	EBS 190	2.25	through mean 401
257	PI 218225	simplicifolium		EBS 525	2.25	through mean 401
258	PI 186549	ehrenbergii	Mexico	Haw 1102	2.21	through mean 401
259	USW 5293.5	phureja x 1N Katahdin		275710.2 x USW 1	2.21	through mean 401
260	PI 230462	moscopanum	Colombia	CPC 2176	2.21	through mean 401
261	PI 225679	phureja	Colombia	CCC 133	2.21	through mean 401
262	PI 275127	acaule	Argentina	Hje 358	2.17	through mean 401
263	PI 275184	bulbocastanum	Mexico	Haw 1581	2.17	through mean 401
264	PI 186548	ehrenbergii	Mexico	Haw 1100	2.17	through mean 401
265	USW 5293.4	phureja x 1N Katahdin		275710.2 x USW 1	2.17	through mean 401
266	PI 210042	multidissectum	Peru	Hje 1337	2.17	through mean 401
267	PI 195160	acaule		CPC 528.7.1	2.09	through mean 401
268	PI 275183	brachycarpum	Mexico	Haw 1710	2.09	through mean 401
269	WRF 305	chacoense			2.09	through mean 401
270	WRF 1271	brachistotrichum			2.08	through mean 401
271	PI 243509	bulbocastanum	Mexico	Gra 395 x 398	2.08	through mean 401
272	PI 262895	fendleri	Mexico	Gen	2.08	through mean 401
273	PI 161173	verrucosum	Mexico	Cor 14252	2.08	through mean 401
274		tuberosum subsp. tuberosum		Minn. Code 125	2.08	through mean 401
275	PI 234013	stenotomum	Bolivia	Gan 21	2.04	through mean 401

Table 1 (continued). Relative resistance of various tuber-bearing Solanum introductions to potato aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no[a]	Mean no. aphids/plant[b]	Not significantly different[c]
276	PI 210029	acaule	Bolivia	Hje 994	2.00	through mean 401
277	PI 225620	acaule		CCC 592	2.00	through mean 401
278	PI 230495	acroscopicum	Peru	Och 2043	2.00	through mean 401
279	PI 225651	curtilobum	Colombia	CCC 481	2.00	through mean 401
280	PI 275174	hjertingii	Mexico	Haw 1356	2.00	through mean 401
281	PI 255522	polytrichon	Mexico	Gra 278	2.00	through mean 401
282	PI 283071.1	boliviense	Bolivia	EBS 1845	2.00	through mean 401
283	PI 161741.2	hougasii	Mexico	Cor 14342b	2.00	through mean 401
284	USW 5798.1	1N Katahdin x phureja		USW 7 x 195198.5	2.00	through mean 401
285	PI 230511	soukupii	Peru	Och 2032	2.00	through mean 401
286	PI 161167	demissum	Mexico	Cor 14240	1.92	through mean 401
287	PI 186563	stoloniferum	Mexico	Haw 1119	1.92	through mean 401
288	PI 275247	stoloniferum	Mexico	Haw 1403	1.92	through mean 401
289	PI 229894	tuberosum subsp. andigena	Peru		1.92	through mean 401
290	PI 225677	phureja	Colombia	CCC 181	1.92	through mean 401
291	PI 243349	agrimonifolium	Guatemala	Gra 136	1.88	through mean 401
292	PI 255520.1	ehrenbergii	Mexico	Gra 371	1.88	through mean 401
293	PI 205397	sanctae-rosae	Argentina	Bru	1.88	through mean 401
294	PI 275185	bulbocastanum	Mexico	Haw 1582	1.84	through mean 401
295	PI 160222	demissum	Mexico	Cor 14201	1.84	through mean 401
296	PI 205522	stoloniferum	Mexico	CPC 28.4	1.84	through mean 401
297	PI 225672	phureja	Colombia	CCC 125	1.84	through mean 401
298	PI 255526	polytrichon	Mexico	Gra 356	1.84	through mean 401
299	PI 275186	bulbocastanum	Mexico	Haw 1583	1.83	through mean 401
300	PI 266384	canasense	Peru	Cor P 749	1.83	through mean 401
301	PI 275252	stoloniferum	Mexico	Haw 1720	1.83	through mean 401
302	PI 225688	phureja	Colombia	CCC 234	1.79	through mean 401
303	PI 245924	etuberosum	Chile	Cor C 143	1.75	through mean 401
304	PI 275244	stoloniferum	Mexico	Haw 1293	1.75	through mean 401
305	PI 230496	tuberosum subsp. andigena	Peru	Och 808	1.75	through mean 401
306	PI 230499	tuberosum subsp. andigena	Peru	Och 1226	1.75	through mean 401
307	PI 255548	stoloniferum	Mexico	Gra 362	1.75	through mean 401
308	PI 275269.5	chiquidenum	Peru	Och 1506	1.75	through mean 401
309	PI 245320	tuberosum subsp. tuberosum	Chile	Cor C 11	1.75	through mean 401
310	PI 283082	megistacrolobum	Bolivia	EBS 1787	1.75	through mean 401
311	PI 210052	multidissectum	Peru	Hje 1407	1.71	through mean 401
312	PI 243511	bulbocastanum	Mexico	Gra 397 x 360	1.67	through mean 401
313	PI 255535	stoloniferum	Mexico	Gra 368	1.67	through mean 401
314	PI 218218	spegazzinii	Argentina	EBS 510	1.67	through mean 401
315	PI 265579	infundibuliforme	Argentina	Cor A 678	1.63	through mean 401
316	PI 275274.4	pampasense	Peru	EBS 1894	1.63	through mean 401
317	PI 160229	demissum	Mexico	Cor 14219	1.58	through mean 401
318	PI 161732	demissum	Mexico	Cor 14412	1.58	through mean 401
319	PI 251063	hjertingii	Mexico	Haw 1355	1.58	through mean 401
320	PI 255542	trifidum	Mexico	Gra 460	1.58	through mean 401
321	PI 186179	tuberosum subsp. andigena	Peru	Och	1.58	through mean 401
322	PI 275240	polytrichon	Mexico	Haw 1467	1.58	through mean 401
323	PI 283074	canasense	Peru	EBS 1921	1.54	through mean 401
324	PI 255536	trifidum	Mexico	Gra 244 x 243	1.54	through mean 401
325	PI 225650	curtilobum	Colombia	CCC 480	1.50	through mean 401
326	PI 186561	demissum	Mexico	Haw 1117	1.50	through mean 401
327	PI 275212	ehrenbergii	Mexico	Haw 1427	1.50	through mean 401
328	PI 161730	guerreroense	Mexico	Cor 14410	1.50	through mean 401
329	PI 283064	trifidum	Mexico	Gra 301 x 244	1.50	through mean 401
330	PI 210038.1	gourlayi	Argentina	Hje 962	1.50	through mean 401

Table 1 (continued). Relative resistance of various tuber-bearing Solanum introductions to potato aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no[a]	Mean no. aphids/plant[b]	Not significantly different[c]
331	PI 195190	jamesii		CPC 1439	1.50	through mean 401
332	PI 265872	medians	Peru	EBS 1905	1.50	through mean 401
333	PI 243462	phureja	Colombia	CCC 117	1.50	through mean 401
334	PI 161164	demissum	Mexico	Cor 14237	1.46	through mean 401
335	PI 275126	acaule	Argentina	Hje 353b	1.42	through mean 401
336	WRF 1270	ajanhuiri			1.42	through mean 401
337	PI 243506	bulbocastanum	Mexico	Gra 362 x 361	1.42	through mean 401
338	PI 275188	bulbocastanum	Mexico	Haw 1585	1.42	through mean 401
339	PI 230589	demissum	Mexico	Redd 178	1.42	through mean 401
340	WRF 547	polytrichon			1.42	through mean 401
341	PI 265864	canasense	Peru	EBS 1831	1.38	through mean 401
342	PI 230506	bukasovii	Peru	Och 37	1.34	through mean 401
343	PI 275187	bulbocastanum	Mexico	Haw 1584	1.34	through mean 401
344	PI 232839	tuberosum subsp. andigena	Peru		1.34	through mean 401
345	PI 266385	canasense	Peru	Cor P 750	1.33	through mean 401
346	PI 186550	demissum	Mexico	Haw 1073	1.33	through mean 401
347	PI 195162	tuberosum subsp. andigena		CPC 300	1.33	through mean 401
348	PI 233994	tuberosum subsp. andigena	Bolivia	Gan 23	1.33	through mean 401
349	PI 210055	multidissectum	Peru	Hje 1583	1.33	through mean 401
350	PI 255545	polytrichon	Mexico	Gra 250	1.33	through mean 401
351	PI 246533	canasense	Peru	Cor P 223	1.25	through mean 401
352	PI 265875	canasense	Peru	EBS 1882	1.25	through mean 401
353	PI 161155	demissum	Mexico	Cor 14224	1.25	through mean 401
354	PI 195172	verrucosum	Mexico	CPC 54.4	1.25	through mean 401
355	PI 245797	tuberosum subsp. tuberosum	Chile	Cor C 57	1.25	through mean 401
356	PI 245820	tuberosum subsp. tuberosum	Chile	Cor C 80	1.25	through mean 401
357	PI 275182	brachycarpum	Mexico	Haw 1655	1.17	through mean 401
358	PI 243508	bulbocastanum	Mexico	Gra 395 x 359	1.17	through mean 401
359	PI 251067	hjertingii	Mexico	Haw 1378	1.17	through mean 401
360	PI 208780	oxycarpum	Costa Rica		1.17	through mean 401
361	PI 225675	phureja	Colombia	CCC 131	1.17	through mean 401
362	PI 275164	fendleri	USA	Haw 1204	1.13	through mean 401
363	PI 245317	tuberosum subsp. tuberosum	Chile	Cor C 8	1.13	through mean 401
364	PI 243512	bulbocastanum	Mexico	Gra 398 x 359	1.08	through mean 401
365	PI 251724	stoloniferum	Mexico	Haw 1402	1.08	through mean 401
366	PI 255547	polytrichon	Mexico	Gra 358	1.08	through mean 401
367	PI 265873	megistacrolobum	Bolivia	EBS 1793	1.08	through mean 401
368	PI 275241	polytrichon	Mexico	Haw 1669	1.08	through mean 401
369	PI 186560	hjertingii	Mexico	Haw 1114	1.00	through mean 401
370	PI 255543	verrucosum	Mexico	Gra 304	1.00	through mean 401
371	PI 184765.4	cardiophyllum	Mexico	Haw 1095	1.00	through mean 401
372	PI 253221	vallis-mexici	Mexico	Haw 1673	1.00	through mean 401
373	PI 210044	multidissectum	Peru	Hje 1366	1.00	through mean 401
374	PI 210051	multidissectum	Peru	Hje 1370	1.00	through mean 401
375	PI 201850	demissum		Belg dem 48	0.92	through mean 401
376	PI 161178	stoloniferum	Mexico	Cor 14263	0.92	through mean 401
377	PI 275249	stoloniferum	Mexico	Haw 1521	0.92	through mean 401
378	PI 275254	verrucosum	Mexico	Haw 1513	0.92	through mean 401
379	PI 283106	polytrichon	Mexico	Haw 1469	0.92	through mean 401
380	PI 255530	stenophyllidium	Mexico	Gra 348 x 345	0.92	through mean 401
381	USW 5323.3	phureja x 1N M 20-20-34		225696.1 x USW 4	0.88	through mean 401
382	PI 275271	bukasovii	Peru	EBS 1900	0.84	through mean 401
383	PI 230494	acaule	Peru	Och 2065	0.83	through mean 401
384	PI 160224	stoloniferum	Mexico	Cor 14208	0.83	through mean 401
385	PI 275216	ehrenbergii	Mexico	Haw 1421	0.75	through mean 401

Table 1 (continued). Relative resistance of various tuber-bearing Solanum introductions to potato aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no[a]	Mean no. aphids/plant[b]	Not significantly different[c]
386	PI 255537	trifidum	Mexico	Gra 299 x 244	0.75	through mean 401
387	PI 251749	polytrichon	Mexico	Haw 1468	0.75	through mean 401
388	WRF 1144	andreanum			0.67	through mean 401
389	PI 275198	bulbocastanum	Mexico	Haw 1595	0.67	through mean 401
390	PI 243340	chomatophilum	Peru	Och 1512	0.67	through mean 401
391	PI 184773	polytrichon	Mexico	Haw 1104	0.67	through mean 401
392	PI 251062	fendleri	Mexico	Haw 1230	0.63	through mean 401
393	PI 275246	stoloniferum	Mexico	Haw 1392	0.58	through mean 401
394	PI 234012	stenotomum	Bolivia	Gan 9	0.58	through mean 401
395	PI 275193	bulbocastanum	Mexico	Haw 1590	0.50	through mean 401
396	PI 275195	bulbocastanum	Mexico	Haw 1592	0.50	through mean 401
397	PI 243510	bulbocastanum	Mexico	Gra 397 x 359	0.38	through mean 401
398	PI 184770	polytrichon	Mexico	Haw 1101	0.38	through mean 401
399	PI 186559	hjertingii	Mexico	Haw 1113	0.33	through mean 401
400	PI 275189	bulbocastanum	Mexico	Haw 1586	0.25	through mean 401
401	PI 160226	stoloniferum	Mexico	Cor 14213	0.00	last mean

[a] See Wis. Bull. 533 for explanation of collector's or donor's prefix and stock number.

[b] 4-12 plants sampled per introduction.

[c] Duncan's New Multiple Range Test applied at 5% level of significance. Standard error of mean is 0.142054.

Table 2. Relative resistance of various tuber-bearing Solanum introductions to green peach aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no.[a]	Mean no. aphids/plant[b]	Not significantly different[c]
1	PI 275206	demissum	Mexico	Haw 1295	26.00	through mean 11
2	PI 161367	demissum	Mexico	Cor 14286	24.08	through mean 20
3	PI 161715	demissum	Mexico	Cor 14379	22.08	through mean 35
4	PI 230494	acaule	Peru	Och 2065	20.50	through mean 52
5	WRF 890	kurtzianum			20.38	through mean 52
6	WRF 311	chacoense			19.00	through mean 68
7	PI 161168	demissum	Mexico	Cor 14243	19.00	through mean 68
8	WRF 332	kurtzianum			18.92	through mean 68
9	PI 246979	tuberosum subsp. andigena	Ecuador	Cor E 448	18.75	through mean 69
10	PI 245937.1	tuberosum subsp. tuberosum	Chile	Cor C 133	18.25	through mean 77
11	PI 265576	chacoense	Argentina	Cor A 707	18.17	through mean 80
12	PI 218224	simplicifolium	Argentina	EBS 447	18.08	through mean 80
13	PI 230466	tarijense	Bolivia	CPC 1727.3 x 144	17.67	through mean 83
14	PI 175435	kurtzianum	Argentina	EBS 421	17.67	through mean 83
15	PI 225636	tuberosum subsp. andigena	Colombia	CCC 679	17.13	through mean 94
16	PI 265871	brevicaule	Bolivia	EBS 1812	16.88	through mean 104
17	PI 161163	demissum	Mexico	Cor 14236	16.75	through mean 107
18	PI 246536	sparsipilum	Peru	Cor P 230	16.50	through mean 110
19	PI 255545	polytrichon	Mexico	Gra 250	16.42	through mean 112
20	PI 275238	polyadenium	Mexico	Haw 1568	16.08	through mean 121
21	PI 234014	sparsipilum	Bolivia	Gra	15.42	through mean 133
22	PI 186547	polytrichon	Mexico	Haw 1103	15.17	through mean 142
23	PI 161732	demissum	Mexico	Cor 14412	15.13	through mean 144
24	PI 230465.2	sucrense	Bolivia	CPC 2058	15.13	through mean 144
25	PI 160212	demissum	Mexico	Cor 14217	15.00	through mean 149
26	WRF 330	kurtzianum			15.00	through mean 149
27	PI 243350	agrimonifolium	Guatemala	Gra 145	14.79	through mean 156
28	PI 230502	sparsipilum	Peru	Och 2064	14.67	through mean 160
29	PI 275141	chacoense	Argentina	Hje 357	14.38	through mean 166
30	PI 245931.1	tuberosum subsp. tuberosum	Chile	Cor C 130	14.25	through mean 169
31	PI 210032	acaule	Peru	Hje 1409	14.17	through mean 171
32	WRF 889	chacoense			14.17	through mean 171
33	PI 255522	polytrichon	Mexico	Gra 278	14.17	through mean 171
34	PI 160222	demissum	Mexico	Cor 14201	13.84	through mean 182
35	PI 230480	polyadenium	Mexico	Gra 2	13.67	through mean 192
36	PI 175401.1	chacoense	Argentina	EBS 20/5	13.63	through mean 197
37	PI 265882	tuberosum subsp. andigena	Bolivia	EBS 1797	13.50	through mean 200
38	PI 217458	tarijense	Argentina	Sleu 4024	13.50	through mean 200
39	PI 209771	tuberosum subsp. tuberosum		Bru	13.34	through mean 204
40	PI 210033	acaule	Peru	Hje 1086	13.08	through mean 209
41	PI 218222	simplicifolium	Argentina	EBS 1876	12.83	through mean 218
42	PI 218223	simplicifolium	Argentina	EBS 190	12.67	through mean 222
43	PI 275276	sparsipilum	Bolivia	EBS 1801	12.63	through mean 224
44	WRF 365	chacoense			12.59	through mean 224
45	WRF 976	chacoense			12.50	through mean 235
46	PI 230468	vernei			12.50	through mean 235
47	PI 161154	demissum	Mexico	Cor 14223	12.42	through mean 240
48	PI 195160	acaule		CPC 528.7.1	12.17	through mean 249
49	PI 205390	kurtzianum	Argentina	Bru	12.17	through mean 249
50	PI 275242.3	sambucinum	Mexico	Haw 1439	12.13	through mean 252
51	PI 275179	brachycarpum	Mexico	Haw 1547	12.00	through mean 260
52	PI 205515	demissum	Mexico	CPC 14.2	11.92	through mean 260
53	PI 230589	demissum	Mexico	Redd 178	11.75	through mean 269
54	PI 265862	raphanifolium	Peru	EBS 1880	11.75	through mean 269
55	PI 209412	chacoense	Argentina	Bru 58	11.67	through mean 274

Table 2 (continued). Relative resistance of various tuber-bearing Solanum introductions to green peach aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no.[a]	Mean no. aphids/plant[b]	Not significantly different[c]
56	PI 275176	agrimonifolium	Guatemala	Haw 1851	11.50	through mean 281
57	PI 209411	chacoense	Argentina	Bru 57	11.50	through mean 281
58	PI 229894	tuberosum subsp. andigena	Peru		11.50	through mean 281
59	PI 210039	sparsipilum	Bolivia	Hje 1051	11.50	through mean 281
60	PI 218225	simplicifolium		EBS 525	11.00	through mean 300
61	USW 5305.1	stenotomum x 1N Katahdin		234011.4 x USW 1	10.88	through mean 304
62	PI 218217	colombianum	Colombia	EBS 572	10.63	through mean 318
63	PI 275237	polyadenium	Mexico	Haw 1567	10.58	through mean 318
64	PI 175138	chacoense	Argentina	Hje 56	10.50	through mean 324
65	PI 186550	demissum	Mexico	Haw 1073	10.50	through mean 324
66	PI 230512	stenotomum	Peru	Och 1922	10.42	through mean 327
67	PI 275153	sparsipilum	Peru	Hje 1534	10.34	through mean 331
68	PI 243352	agrimonifolium	Guatemala	Gra 145b	10.33	through mean 331
69	PI 266381	acaule	Peru	Cor P 863	10.17	through mean 339
70	PI 230556	acaule	Argentina	EBS 496	10.00	through mean 348
71		tuberosum subsp. tuberosum, "Norland"			10.00	through mean 348
72	PI 186545	polytrichon	Mexico	Haw 1090	9.92	through mean 350
73	PI 230463	polyadenium	Mexico	CPC 2077.5	9.83	through mean 353
74	PI 245320	tuberosum subsp. tuberosum	Chile	Cor C 11	9.75	through mean 362
75		tuberosum subsp. tuberosum		Minn. Code 151	9.75	through mean 362
76	PI 208866	simplicifolium	Argentina	Bru 45	9.75	through mean 362
77	PI 275229	papita	Mexico	Haw 1488	9.67	through mean 363
78	PI 255533	stoloniferum	Mexico	Gra 341	9.50	through mean 372
79	USW 5314.2	phureja x 1N M 20-20-34		225708.1 x USW 4	9.50	through mean 372
80	PI 283116	phureja	Colombia	Och 1399	9.50	through mean 372
81	WRF 1306	tuberosum subsp. tuberosum			9.33	through mean 380
82	PI 283114	mochicense	Peru	Och 1822	9.17	through mean 387
83	PI 275125	acaule	Argentina	Hje 344	9.08	through mean 388
84	PI 160228	verrucosum	Mexico	Cor 14217	8.83	through mean 398
85	USW 5298.3	stenotomum x 1N Katahdin		205526.2 x USW 1	8.75	through mean 401
86	PI 225688	phureja	Colombia	CCC 234	8.75	through mean 401
87	PI 225620	acaule		CCC 592	8.67	through mean 401
88	PI 230517	unidentified	Ecuador	Och 2104	8.67	through mean 401
89	WRF 341	pinnatisectum			8.67	through mean 401
90	PI 283069	berthaultii	Bolivia	EBS 1842	8.58	through mean 401
91	PI 275129	acaule	Peru	Hje 1582	8.42	through mean 401
92	PI 218215	berthaultii	Argentina	EBS 191	8.42	through mean 401
93	PI 275148	megistacrolobum	Argentina	Hje 255	8.42	through mean 401
94	PI 208563	maglia	Argentina	Bru 39	8.38	through mean 401
95	PI 210048	raphanifolium	Peru	Hje 1521	8.33	through mean 401
96	PI 234004	chaucha	Bolivia	Gan	8.29	through mean 401
97	PI 186176	acaule	Peru	Och	8.25	through mean 401
98	PI 255501	acaule	Argentina	Bru 802	8.25	through mean 401
99	PI 239423	hougasii	Mexico	Gra 368	8.25	through mean 401
100	PI 265878	raphanifolium	Peru	EBS 1879	8.21	through mean 401
101	PI 255526	polytrichon	Mexico	Gra 356	8.17	through mean 401
102	WRF 1283	simplicifolium			8.17	through mean 401
103	PI 247322	colombianum	Colombia	Cor Co 525	8.13	through mean 401
104	USW 5288.1	phureja x 1N Katahdin		225683.1 x USW 1	8.13	through mean 401
105	PI 275183	brachycarpum	Mexico	Haw 1710	8.00	through mean 401
106	PI 161174	hougasii	Mexico	Cor 14253	8.00	through mean 401
107	PI 258910	stenotomum	Bolivia	Car	8.00	through mean 401
108	PI 230498	tuberosum subsp. andigena	Peru	Och 868	7.92	through mean 401
109		tuberosum subsp. tuberosum, "Chisago"			7.83	through mean 401
110	PI 275239	polyadenium	Mexico	Haw 1569	7.83	through mean 401

Table 2 (continued). Relative resistance of various tuber-bearing Solanum introductions to green peach aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no[a]	Mean no. aphids /plant[b]	Not significantly different[c]
111	PI 217451	chacoense	Argentina	Sleu 3566	7.67	through mean 401
112	PI 225667	phureja	Colombia	CCC 147	7.67	through mean 401
113	PI 225681	phureja	Colombia	CCC 143	7.58	through mean 401
114	PI 230582	chacoense		Slee	7.50	through mean 401
115	PI 160229	demissum	Mexico	Cor 14219	7.50	through mean 401
116	PI 275162	fendleri	USA	Haw 1177	7.50	through mean 401
117	PI 195214	stenotomum	Peru	CPC 1793	7.50	through mean 401
118	USW 5293.2	phureja x 1N Katahdin		275710.2 x USW 1	7.42	through mean 401
119	PI 275228	papita	Mexico	Haw 1486	7.42	through mean 401
120	PI 230489	pinnatisectum	Mexico	Roc S-44	7.42	through mean 401
121	PI 258911	stenotomum	Bolivia	Car	7.38	through mean 401
122	PI 265575	simplicifolium	Argentina	Cor A 705	7.25	through mean 401
123	PI 230562	vernei	Argentina	EBS 181	7.08	through mean 401
124		tuberosum subsp. tuberosum		Minn. Code 157	7.08	through mean 401
125	PI 186554	pinnatisectum	Mexico	Haw 1093	7.08	through mean 401
126	USW 5323.1	phureja x 1N M 20-20-34		225696.1 x USW 4	6.88	through mean 401
127	PI 161164	demissum	Mexico	Cor 14237	6.83	through mean 401
128	PI 218047	demissum		BB	6.75	through mean 401
129	PI 255547	polytrichon	Mexico	Gra 304	6.75	through mean 401
130	PI 258909	stenotomum	Bolivia	Car	6.75	through mean 401
131	PI 208780	oxycarpum	Costa Rica		6.75	through mean 401
132	PI 225677	phureja	Colombia	CCC 181	6.67	through mean 401
133	PI 245841	tuberosum subsp. tuberosum	Chile	Cor C 101	6.63	through mean 401
134	PI 175444	polyadenium	Mexico	EBS 51	6.59	through mean 401
135	PI 243503	commersonii	Argentina	Fer	6.58	through mean 401
136		tuberosum subsp. tuberosum		Minn. Code 125	6.58	through mean 401
137	PI 225675	phureja	Colombia	CCC 131	6.50	through mean 401
138	USW 5323.4	phureja x 1N M 20-20-34		225696.1 x USW 4	6.46	through mean 401
139	PI 266384	canasense	Peru	Cor P 749	6.42	through mean 401
140	PI 265872	medians	Peru	EBS 1905	6.42	through mean 401
141	PI 225673	phureja	Colombia	CCC 178	6.42	through mean 401
142	PI 243349	agrimonifolium	Guatemala	Gra 136	6.38	through mean 401
143	PI 275163	fendleri	USA	Haw 1180	6.33	through mean 401
144	PI 205526	stenotomum	Peru	CPC 320 x 1839	6.33	through mean 401
145	PI 225694	phureja	Colombia	CCC 10	6.29	through mean 401
146	PI 275158	fendleri	USA	Haw 1158	6.25	through mean 401
147	PI 230584.4	kurtzianum	Argentina	Slee	6.25	through mean 401
148	PI 245820	tuberosum subsp. tuberosum		Cor C 80	6.25	through mean 401
149	PI 251741	papita	Mexico	Haw 1476	6.25	through mean 401
150	PI 230457	tuberosum subsp. andigena		CPC 1464	6.17	through mean 401
151	PI 230474	tuberosum subsp. andigena	Peru	IAIAS 3323	6.13	through mean 401
152	PI 275139	chacoense	Argentina	Hje 297	6.09	through mean 401
153	PI 186179	tuberosum subsp. andigena	Peru	Och	6.04	through mean 401
154	PI 205622	tuberosum subsp. andigena		CPC 1673 x 2201(30)	6.00	through mean 401
155	PI 246497.1	tuberosum subsp. andigena	Peru	Cor P 164	6.00	through mean 401
156	PI 243460	phureja	Colombia	CCC 80	6.00	through mean 401
157	PI 275275	pampasense	Peru	EBS 1895	5.96	through mean 401
158	PI 225651	curtilobum	Colombia	CCC 481	5.88	through mean 401
159	PI 133619	chacoense	Argentina		5.88	through mean 401
160	USW 5798.1	1N Katahdin x phureja		USW 7 x 195198.5	5.88	through mean 401
161	PI 205395	acaule	Argentina	Bru	5.84	through mean 401
162	PI 275167	fendleri	USA	Haw 1217	5.84	through mean 401
163	PI 275251	stoloniferum	Mexico	Haw 1669	5.84	through mean 401
164	PI 161730	guerreroense	Mexico	Cor 14410	5.75	through mean 401
165	PI 210049	raphanifolium	Peru	Hje 1529	5.63	through mean 401

Table 2 (continued). Relative resistance of various tuber-bearing Solanum introductions to green peach aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no.[a]	Mean no. aphids/plant[b]	Not significantly different[c]
166	PI 283102	fendleri	Mexico	Haw 1314	5.58	through mean 401
167	PI 265885	oplocense	Bolivia	EBS 1789	5.50	through mean 401
168	PI 283105.1	papita	Mexico	Haw 1475	5.50	through mean 401
169	PI 225683	phureja	Colombia	CCC 192	5.50	through mean 401
170	PI 275159	fendleri	USA	Haw 1160	5.42	through mean 401
171	PI 225679	phureja	Colombia	CCC 133	5.38	through mean 401
172	WRF 305	chacoense			5.34	through mean 401
173	PI 233998	tuberosum subsp. andigena	Bolivia	Gra 34	5.34	through mean 401
174		tuberosum subsp. tuberosum, "Pontiac"			5.34	through mean 401
175	PI 218226	simplicifolium		EBS 626	5.33	through mean 401
176	PI 265881	simplicifolium	Argentina	EBS 1802	5.33	through mean 401
177	PI 255490	ajanhuiri	Bolivia	CEEA 17	5.25	through mean 401
178	PI 230500	tuberosum subsp. andigena	Peru	EBS 1906	5.25	through mean 401
179	PI 225693	phureja	Colombia	CCC 11	5.25	through mean 401
180	PI 275126	acaule	Argentina	Hje 353b	5.17	through mean 401
181	PI 233992	tuberosum subsp. andigena	Bolivia	Gra 39	5.09	through mean 401
182	PI 245764	brevidens	Chile	Cor C 15	5.04	through mean 401
183	PI 243351	agrimonifolium	Guatemala	Gra 145a	5.00	through mean 401
184	PI 275136	chacoense	Argentina	Hje 349	5.00	through mean 401
185	PI 217457	tarijense	Argentina	Sleu 4002	5.00	through mean 401
186	PI 230499	tuberosum subsp. andigena	Peru	Och 1226	5.00	through mean 401
187	PI 275161	fendleri	USA	Haw 1174	4.96	through mean 401
188	PI 217450	acaule	Argentina	Sleu 4114	4.92	through mean 401
189	PI 265858	berthaultii	Bolivia	EBS 1846	4.92	through mean 401
190	WRF 345	pinnatisectum			4.92	through mean 401
191	PI 184765.4	cardiophyllum	Mexico	Haw 1095	4.88	through mean 401
192	PI 265579	infundibuliforme	Argentina	Cor A 678	4.87	through mean 401
193	PI 186180	tuberosum subsp. andigena	Peru	Och	4.84	through mean 401
194	PI 234007	stenotomum	Bolivia	Gan 29	4.84	through mean 401
195	PI 210040	marinasense	Peru	Hje 1531b	4.83	through mean 401
196	PI 275227	papita	Mexico	Haw 1482	4.83	through mean 401
197	PI 265869	sparsipilum	Bolivia	EBS 1820	4.83	through mean 401
198	USW 5314.1	phureja x 1N M 20-20-34		225708.1 x USW 4	4.75	through mean 401
199	PI 275233.3	pinnatisectum	Mexico	Haw 1455	4.75	through mean 401
200	PI 230513	stenotomum	Peru	Och 1933	4.75	through mean 401
201	WRF 306	chacoense			4.67	through mean 401
202	PI 186181	curtilobum	Peru	Och	4.67	through mean 401
203	PI 210029	acaule	Bolivia	Hje 994	4.59	through mean 401
204	PI 234013	stenotomum	Bolivia	Gan 21	4.54	through mean 401
205	PI 210056	leptophyes	Peru	Hje 1592	4.50	through mean 401
206	PI 275224	oxycarpum	Mexico	Haw 1643	4.50	through mean 401
207	PI 232839	tuberosum subsp. andigena	Peru		4.33	through mean 401
208	PI 233994	tuberosum subsp. andigena	Bolivia	Gra 23	4.33	through mean 401
209	PI 234011	stenotomum	Bolivia	Gan 31	4.33	through mean 401
210	PI 161155	demissum	Mexico	Cor 14224	4.25	through mean 401
211	PI 161167	demissum	Mexico	Cor 14240	4.25	through mean 401
212	PI 275165	fendleri	USA	Haw 1209	4.25	through mean 401
213	PI 245933.1	tuberosum subsp. tuberosum	Chile	Cor C 131	4.25	through mean 401
214	PI 195198	phureja	Colombia	CPC 979	4.25	through mean 401
215	PI 275231	pinnatisectum	Mexico	Haw 1426	4.25	through mean 401
216	PI 175396	acaule		EBS 208a	4.17	through mean 401
217	PI 233997	tuberosum subsp. andigena	Bolivia	Gra 45	4.17	through mean 401
218	PI 275232	pinnatisectum	Mexico	Haw 1435	4.17	through mean 401
219	PI 275157	fendleri	USA	Haw 1157	4.00	through mean 401
220	PI 245839	tuberosum subsp. tuberosum	Chile	Cor C 99	4.00	through mean 401

Table 2 (continued). Relative resistance of various tuber-bearing Solanum introductions to green peach aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no.[a]	Mean no. aphids/plant[b]	Not significantly different[c]
221	PI 265578	megistacrolobum	Bolivia	Cor B 654	4.00	through mean 401
222	PI 255543	verrucosum	Mexico	Gra 304	3.92	through mean 401
223	WRF 1270	ajanhuiri			3.83	through mean 401
224	PI 266385	canasense	Peru	Cor P 750	3.83	through mean 401
225	PI 275132	acaule	Argentina	Hje 353a	3.75	through mean 401
226	PI 2453512	bulbocastanum	Mexico	Gra 398 x 359	3.75	through mean 401
227	PI 283100	fendleri	USA	Haw 1216	3.75	through mean 401
228	PI 275244	stoloniferum	Mexico	Haw 1293	3.75	through mean 401
229	PI 230497	tuberosum subsp. andigena	Peru	Och 816	3.75	through mean 401
230	PI 245317	tuberosum subsp. tuberosum	Chile	Cor C 8	3.75	through mean 401
231	PI 245797	tuberosum subsp. tuberosum	Chile	Cor C 57	3.75	through mean 401
232	USW 5293.6	phureja x 1N Katahdin		275710.2 x USW 1	3.75	through mean 401
233	USW 5323.3	phureja x 1N M 20-20-34		225696.1 x USW 4	3.75	through mean 401
234	PI 275149	megistacrolobum	Argentina	Hje 316	3.75	through mean 401
235	USW 5293.5	phureja x 1N Katahdin		275710.2 x USW 1	3.71	through mean 401
236	PI 218228	brevidens		EBS 388	3.67	through mean 401
237	PI 275257	verrucosum	Mexico	Haw 1532	3.67	through mean 401
238	PI 275182	brachycarpum	Mexico	Haw 1655	3.63	through mean 401
239	PI 210052	multidissectum	Peru	Hje 1407	3.63	through mean 401
240	PI 230511	soukupii	Peru	Och 2032	3.63	through mean 401
241	PI 265861	boliviense	Bolivia	EBS 1847	3.58	through mean 401
242	PI 225649	curtilobum	Colombia	CCC 479	3.58	through mean 401
243	PI 275266	jamesii	USA	Gra 388 x 384	3.50	through mean 401
244	PI 275234	pinnatisectum	Mexico	Haw 1456	3.50	through mean 401
245	PI 275240	polytrichon	Mexico	Haw 1467	3.50	through mean 401
246	PI 275127	acaule	Argentina	Hje 358	3.42	through mean 401
247	PI 243509	bulbocastanum	Mexico	Gra 395 x 398	3.42	through mean 401
248	PI 283081	medians	Peru	EBS 1906	3.42	through mean 401
249	USW 5298.5	stenotomum x 1N Katahdin		205526.2 x USW 1	3.38	through mean 401
250	PI 251067	hjertingii	Mexico	Haw 1378	3.34	through mean 401
251	PI 275133	acaule	Argentina	Hje 1898	3.33	through mean 401
252	PI 275143	spegazzinii	Argentina	Hje 1893	3.33	through mean 401
253	PI 161719	demissum	Mexico	Cor 14413	3.25	through mean 401
254	PI 186561	demissum	Mexico	Haw 1117	3.25	through mean 401
255	WRF 1276	ehrenbergii			3.25	through mean 401
256	PI 251063	hjertingii	Mexico	Haw 1355	3.25	through mean 401
257	WRF 1154	tarijense			3.25	through mean 401
258	PI 275278.2	sucrense	Bolivia	EBS 1790	3.25	through mean 401
259	PI 275265	jamesii	USA	Gra 388 x 381	3.25	through mean 401
260	PI 225668	phureja	Colombia	CCC 247	3.25	through mean 401
261	PI 262895	fendleri	Mexico	Gen	3.09	through mean 401
262	PI 195162	tuberosum subsp. andigena		CPC 300	3.09	through mean 401
263	PI 161173	verrucosum	Mexico	Cor 14252	3.09	through mean 401
264	PI 275256	verrucosum	Mexico	Haw 1528	3.08	through mean 401
265	PI 275147	megistacrolobum	Argentina	Hje 366	3.08	through mean 401
266	PI 275156	fendleri	USA	Haw 1156	3.00	through mean 401
267	PI 230462	moscopanum	Colombia	CPC 2176	3.00	through mean 401
268	PI 246488	raphanifolium	Peru	Cor P 218	3.00	through mean 401
269	PI 234012	stenotomum	Bolivia	Gan 9	3.00	through mean 401
270	PI 275248	stoloniferum	Mexico	Haw 1520	2.92	through mean 401
271	PI 258855	phureja	Bolivia	Gan	2.92	through mean 401
272	PI 161728	polyadenium	Mexico	Cor 14374	2.92	through mean 401
273	PI 275241	polytrichon	Mexico	Haw 1669	2.92	through mean 401
274	PI 161364	stoloniferum	Mexico	Cor 14270	2.88	through mean 401
275	PI 275260	verrucosum	Mexico	Haw 1658	2.84	through mean 401

Table 2 (continued). Relative resistance of various tuber-bearing Solanum introductions to green peach aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no.[a]	Mean no. aphids/plant[b]	Not significantly different[c]
276	PI 243462	phureja	Colombia	CCC 117	2.84	through mean 401
277	PI 275245	stoloniferum	Mexico	Haw 1388	2.83	through mean 401
278	PI 275252	stoloniferum	Mexico	Haw 1720	2.83	through mean 401
279	WRF 547	polytrichon			2.83	through mean 401
280	USW 5293.4	phureja x 1N Katahdin		27510.2 x USW 1	2.79	through mean 401
281	PI 186548	ehrenbergii	Mexico	Haw 1100	2.75	through mean 401
282	WRF 1277	ehrenbergii			2.67	through mean 401
283	PI 265879	megistacrolobum	Argentina	EBS 1783	2.67	through mean 401
284	PI 230495	acroscopicum	Peru	Och 2043	2.59	through mean 401
285	PI 210043	multidissectum	Peru	Hje 1340	2.59	through mean 401
286	PI 255532	stoloniferum	Mexico	Gra 334	2.58	through mean 401
287	PI 225682	phureja	Colombia	CCC 193	2.58	through mean 401
288	PI 275164	fendleri	USA	Haw 1204	2.50	through mean 401
289	PI 275247	stoloniferum	Mexico	Haw 1403	2.50	through mean 401
290	PI 275255	verrucosum	Mexico	Haw 1527	2.50	through mean 401
291	PI 255548	stoloniferum	Mexico	Gra 362	2.50	through mean 401
292	PI 243507	bulbocastanum	Mexico	Gra 386 x 362	2.42	through mean 401
293	PI 186549	ehrenbergii	Mexico	Haw 1102	2.42	through mean 401
294	PI 283143	fendleri		Kra	2.42	through mean 401
295	PI 233961	brevicaule	Bolivia	Gan	2.38	through mean 401
296	PI 225672	phureja	Colombia	CCC 125	2.33	through mean 401
297	PI 265860	boliviense	Bolivia	EBS 1795	2.25	through mean 401
298	PI 201850	demissum		Belg dem 48	2.25	through mean 401
299	PI 255535	stoloniferum	Mexico	Gra 368	2.25	through mean 401
300	PI 275235	pinnatisectum	Mexico	Haw 1457	2.25	through mean 401
301	PI 161178	stoloniferum	Mexico	Cor 14263	2.17	through mean 401
302	PI 265876	bukasovii	Peru	EBS 1899	2.13	through mean 401
303	PI 186178	tuberosum subsp. andigena	Peru	Och	2.09	through mean 401
304	PI 275264	jamesii	USA	Gra 386 x 388	2.08	through mean 401
305	PI 265873	megistacrolobum	Bolivia	EBS 1793	2.04	through mean 401
306	PI 275274.4	pampasense	Peru	EBS 1894	2.00	through mean 401
307	PI 184773	polytrichon	Mexico	Haw 1104	2.00	through mean 401
308	PI 275246	stoloniferum	Mexico	Haw 1392	1.96	through mean 401
309	PI 243511	bulbocastanum	Mexico	Gra 397 x 360	1.92	through mean 401
310	PI 275216	ehrenbergii	Mexico	Haw 1421	1.92	through mean 401
311	PI 255534	stoloniferum	Mexico	Gra 366	1.92	through mean 401
312	PI 251724	stoloniferum	Mexico	Haw 1402	1.92	through mean 401
313	PI 210044	multidissectum	Peru	Hje 1366	1.92	through mean 401
314	PI 283071.1	boliviense	Bolivia	EBS 1845	1.88	through mean 401
315	PI 184770	polytrichon	Mexico	Haw 1101	1.88	through mean 401
316	PI 225650	curtilobum	Colombia	CCC 480	1.84	through mean 401
317	PI 275250	stoloniferum	Mexico	Haw 1554	1.84	through mean 401
318	PI 275263	jamesii	USA	Gra 382 x 381	1.84	through mean 401
319	PI 275199	bulbocastanum	Mexico	Haw 1596	1.75	through mean 401
320	PI 283062	cardiophyllum	Mexico	Gra	1.75	through mean 401
321	PI 218220	venturii	Argentina	EBS 457	1.75	through mean 401
322	PI 161741.2	hougasii	Mexico	Cor 14342b	1.75	through mean 401
323	PI 265874	megistacrolobum	Bolivia	EBS 1808	1.75	through mean 401
324	PI 210042	multidissectum	Peru	Hje 1337	1.75	through mean 401
325	PI 275187	bulbocastanum	Mexico	Haw 1584	1.67	through mean 401
326	PI 265875	canasense	Peru	EBS 1882	1.67	through mean 401
327	PI 251062	fendleri	Mexico	Haw 1230	1.63	through mean 401
328	PI 243345	bulbocastanum	Mexico	Gra 26 x 27	1.59	through mean 401
329	WRF 1144	andreanum			1.58	through mean 401
330	WRF 276	ehrenbergii			1.58	through mean 401

Table 2 (continued). Relative resistance of various tuber-bearing Solanum introductions to green peach aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no.[a]	Mean no. aphids/plant[b]	Not significantly different[c]
331	PI 195172	verrucosum	Mexico	CPC 54.4	1.58	through mean 401
332	PI 275185	bulbocastanum	Mexico	Haw 1582	1.50	through mean 401
333	PI 210038.1	gourlayi	Argentina	Hje 962	1.50	through mean 401
334	PI 230516.1	huancabambense	Peru	Och 2023	1.50	through mean 401
335	PI 230506	bukasovii	Peru	Och 37	1.42	through mean 401
336	PI 275184	bulbocastanum	Mexico	Haw 1581	1.42	through mean 401
337	PI 283074	canasense	Peru	EBS 1921	1.42	through mean 401
338	PI 275174	hjertingii	Mexico	Haw 1356	1.42	through mean 401
339	PI 160224	stoloniferum	Mexico	Cor 14208	1.42	through mean 401
340	PI 243508	bulbocastanum	Mexico	Gra 395 x 359	1.34	through mean 401
341	PI 186563	stoloniferum	Mexico	Haw 1119	1.34	through mean 401
342	PI 205522	stoloniferum	Mexico	CPC 28.4	1.33	through mean 401
343	PI 217453	brevicaule	Argentina	Sleu 3748	1.25	through mean 401
344	PI 243506	bulbocastanum	Mexico	Gra 362 x 361	1.25	through mean 401
345	PI 275186	bulbocastanum	Mexico	Haw 1583	1.25	through mean 401
346	PI 283089	sanctae-rosae	Argentina	EBS 1779	1.25	through mean 401
347	PI 218218	spegazzinii	Argentina	EBS 510	1.25	through mean 401
348	PI 265863	canasense	Peru	EBS 1825	1.21	through mean 401
349	PI 230496	tuberosum subsp. andigena	Peru	Och 808	1.17	through mean 401
350	PI 253221	vallis-mexici	Mexico	Haw 1673	1.13	through mean 401
351	PI 275195	bulbocastanum	Mexico	Haw 1592	1.09	through mean 401
352	PI 186560	hjertingii	Mexico	Haw 1114	1.09	through mean 401
353	PI 218221	sanctae-rosae	Argentina	EBS 438	1.04	through mean 401
354	PI 243510	bulbocastanum	Mexico	Gra 397 x 359	1.00	through mean 401
355	PI 275198	bulbocastanum	Mexico	Haw 1595	1.00	through mean 401
356	PI 266387	chomatophilum	Peru	Cor P 862	1.00	through mean 401
357	PI 275249	stoloniferum	Mexico	Haw 1521	1.00	through mean 401
358	PI 255520.1	ehrenbergii	Mexico	Gra 371	1.00	through mean 401
359	PI 195190	jamesii		CPC 1439	1.00	through mean 401
360	PI 210055	multidissectum	Peru	Hje 1583	1.00	through mean 401
361	PI 283106	polytrichon	Mexico	Haw 1469	1.00	through mean 401
362	PI 234015	stenotomum	Bolivia	Gan 63	0.96	through mean 401
363	PI 160226	stoloniferum	Mexico	Cor 14213	0.92	through mean 401
364	PI 275189	bulbocastanum	Mexico	Haw 1586	0.83	through mean 401
365	PI 186559	hjertingii	Mexico	Haw 1113	0.83	through mean 401
366	PI 275262	jamesii	USA	Gra 381 x 386	0.83	through mean 401
367	PI 275254	verrucosum	Mexico	Haw 1513	0.83	through mean 401
368	PI 230464	sanctae-rosae	Argentina	CPC 2483	0.83	through mean 401
369	PI 275271	bukasovii	Peru	EBS 1900	0.75	through mean 401
370	PI 265864	canasense	Peru	EBS 1831	0.75	through mean 401
371	PI 245924	etuberosum	Chile	Cor C 143	0.75	through mean 401
372	PI 275269.5	chiquidenum	Peru	Och 1506	0.75	through mean 401
373	PI 275188	bulbocastanum	Mexico	Haw 1585	0.67	through mean 401
374	PI 245939	etuberosum	Chile	Cor C 134	0.67	through mean 401
375	PI 255539	trifidum	Mexico	Gra 308 x 305	0.67	through mean 401
376	PI 210051	multidissectum	Peru	Hje 1370	0.67	through mean 401
377	PI 243340	chomatophilum	Peru	Och 1512	0.63	through mean 401
378	PI 255540	trifidum	Mexico	Gra 309 x 311	0.63	through mean 401
379	PI 246533	canasense	Peru	Cor P 223	0.59	through mean 401
380	PI 275214	ehrenbergii	Mexico	Haw 1429	0.58	through mean 401
381	PI 251749	polytrichon	Mexico	Haw 1468	0.50	through mean 401
382	PI 283082	megistacrolobum	Bolivia	EBS 1787	0.50	through mean 401
383	PI 275152	sanctae-rosae	Argentina	Hje 328	0.50	through mean 401
384	WRF 1271	brachistotrichum			0.42	through mean 401
385	PI 275212	ehrenbergii	Mexico	Haw 1427	0.42	through mean 401

Table 2 (continued). Relative resistance of various tuber-bearing Solanum introductions to green peach aphid attack. Grand Rapids, Minn. August 5-13, 1965.

Rank	IR-1 no.	Species, variety or hybrid	Country of origin	Collector or donor no.[a]	Mean no. aphids/plant[b]	Not significantly different[c]
386	PI 275169	jamesii	USA	Haw 1176	0.42	through mean 401
387	PI 283095.3	brachistotrichum	Mexico	Haw 1287 x 1471	0.38	through mean 401
388	PI 210034	megistacrolobum	Bolivia	Hje 1028	0.33	through mean 401
389	PI 255538	trifidum	Mexico	Gra 308 x 301	0.25	through mean 401
390	PI 283079.1	marinasense	Peru	EBS 1883	0.25	through mean 401
391	PI 205397	sanctae-rosae	Argentina	Bru	0.21	through mean 401
392	PI 255527	stenophyllidium	Mexico	Gra 346 x 348	0.21	through mean 401
393	PI 243505	bulbocastanum	Mexico	Gra 361 x 359	0.17	through mean 401
394	PI 283064	trifidum	Mexico	Gra 301 x 244	0.17	through mean 401
395	PI 255530	stenophyllidium	Mexico	Gra 348 x 345	0.17	through mean 401
396	PI 255536	trifidum	Mexico	Gra 244 x 243	0.13	through mean 401
397	PI 275193	bulbocastanum	Mexico	Haw 1590	0.08	through mean 401
398	PI 255528	stenophyllidium	Mexico	Gra 347 x 345	0.08	through mean 401
399	PI 255537	trifidum	Mexico	Gra 299 x 244	0.00	through mean 401
400	PI 255542	trifidum	Mexico	Gra 460	0.00	through mean 401
401	PI 255529	stenophyllidium	Mexico	Gra 347 x 348	0.00	last mean

[a] See Wis. Bull. 533 for explanation of collectors' or donors' prefix and stock numbers.

[b] 4-12 plants sampled per introduction.

[c] Duncan's New Multiple Range Test applied at 5% level of significance. Standard error of mean is 0.2363429.

Table 3. Serial arrangement (after Correll[a] 1962) of the Solanum species surveyed for aphid resistance[b].

SECTION TUBERARIUM BITT.

SUBSECTION HYPERBASARTHRUM BITT.

2 SERIES ETUBEROSA JUZ.
- S. brevidens Phil.
- S. etuberosum Lindl.

4 SERIES PIURANA HAWKES
- S. chiquidenum Ochoa
- S. chomatophilum Bitt.
- S. marinasense Vargas
- S. mochicense Ochoa
- S. pampasense Hawkes

5 SERIES CONICIBACCATA BITT.
- S. agrimonifolium Rydb.
- S. colombianum Dun.
- S. huancabambense Ochoa
- S. moscopanum Hawkes
- S. oxycarpum Schiede

9 SERIES TARIJENSA CORRELL
- S. berthaultii Hawkes
- S. tarijense Hawkes

10 SERIES POLYADENIA BUK. EX CORRELL
- S. polyadenium Grennm.

14 SERIES TRIFIDA CORRELL
- S. trifidum Correll

15 SERIES BULBOCASTANA RYDB.
- S. bulbocastanum Dun. in Poir.

16 SERIES CARDIOPHYLLA BUK. EX CORRELL
- S. cardiophyllum Lindl.
- S. ehrenbergii (Bitt.) Rydb.

17 SERIES PINNATISECTA RYDB.
- S. brachistotrichum Bitt.
- S. jamesii Torr.
- S. pinnatisectum Dun. in DC
- S. sambucinum Rydb. (= ehrenbergii x pinnatisectum)
- S. stenophyllidium Bitt.

18 SERIES COMMERSONIANA BUK.
- S. chacoense Bitt.
- S. commersonii Dun. ex Poir. in Lam.

19 SERIES MEGISTACROLOBA CÁRD. & HAWKES
- S. megistacrolobum Bitt.
- S. raphanifolium Cárd. & Hawkes
- S. sanctae-rosae Hawkes

20 SERIES CUNEOEALATA HAWKES
- S. infundibuliforme Phil.

21 SERIES ACAULIA JUZ.
- S. acaule Bitt.

22 SERIES DEMISSA BUK. EX BUK. & KAMERAZ
- S. brachycarpum Correll
- S. demissum Lindl.
- S. guerreroense Correll
- S. hougasii Correll
- S. verrucosum Schlechtd.

23 SERIES LONGIPEDICELLATA BUK. EX BUK. & KAMERAZ
- S. fendleri A. Gray
- S. hjertingii Hawkes (= vicariad of fendleri)
- S. papita Rydb.
- S. polytrichon Rydb.
- S. stoloniferum Schlechtd.
- S. vallis-mexici Juz. ex Buk. (= stoloniferum x verrucosum)

25 SERIES TRANSAEQUATORIALIA BUK. EX BUK. & KAMERAZ
- S. andreanum Baker
- S. boliviense Dun. in DC
- S. brevicaule Bitt.
- S. bukasovii Juz. ex Rybin
- S. canasense Hawkes
- S. gourlayi Hawkes
- S. kurtzianum Bitt. & Wittm. ex Engl.
- S. leptophyes Bitt.
- S. multidissectum Hawkes
- S. simplicifolium Bitt.
- S. soukupii Hawkes
- S. sparsipilum (Bitt.)Juz. & Buk.
- S. spegazzinii Bitt. (= S. sparsipilum)
- S. venturii Hawkes & Hjerting
- S. vernei Gitt. & Wittm. ex Engl.

26 SERIES TUBEROSA RYDB.
- S. ajanhuiri Juz. & Buk. (S. tuberosum, group Stenotumum)
- S. chaucha Juz. & Buk. (S. tuberosum, group Chaucha)
- S. curtilobum Juz. & Buk.
- S. maglia Schlechtd.
- S. medians Bitt.
- S. phureja Juz. & Buk. (S. tuberosum, group Phureja)
- S. stenotomum Juz. & Buk. (S. tuberosum, group Stenotumum)
- S. tuberosum subsp. andigena (Juz. & Buk.) Hawkes (S. tuberosum group Andigena)
- S. tuberosum subsp. tuberosum (L.) Hawkes (S. tuberosum group Tuberosum)

[a] Correll lists 157 species for the subsection Hyperbasarthrum which he regards as divisible into 36 series.

[b] Species surveyed by present authors listed alphabetically within series.

2M-10/66